

REGULAR PROCESS FOR GLOBAL REPORTING AND ASSESSMENT OF THE STATE OF THE MARINE ENVIRONMENT, INCLUDING SOCIOECONOMIC ASPECTS

ANNOTATED OUTLINE OF THE SECOND WORLD OCEAN ASSESSMENT

Note by the Joint Coordinators

1. At its tenth meeting held on 28 February and 1 March 2018, the Ad Hoc Working Group of the Whole on the Regular Process for Global Reporting and Assessment of the State of the Marine Environment, including Socioeconomic Aspects (the “Regular Process”), following discussions on the revised draft outline presented by the Joint Coordinators of the Group of Experts, approved the Outline for the second world ocean assessment, and requested the Group of Experts to prepare an annotated outline for the second world ocean assessment for the eleventh meeting of the Ad Hoc Working Group of the Whole on the Regular Process to be held from 23 to 24 August 2018.¹
2. A proper annotated outline for the second world ocean assessment can only be prepared when the writing teams for the various chapters and sections are in place, and can consider how they wish to develop the various chapters within the structure of the approved Outline. It would also require an opportunity for the Group of Experts to have a thorough discussion in person (similar to that which took place to develop the draft Outline). Given that the preparation of an annotated outline was not foreseen beforehand, no specific meeting was included in the timetable and implementation plan for the assessment (provided to the Ad Hoc Working Group and approved at the February meeting of the Ad Hoc Working Group of the Whole) to provide such an opportunity.
3. For the reasons explained in the Joint Coordinators’ report on the preliminary timetable and implementation plan, the assembling of writing teams is still under way for most of the chapters (there are some that have been finalised particularly some of the sections within Chapters 6 and 7 where individual writing teams are needed). In setting writing teams up, it is important to ensure a good distribution of experts from around the world, so that the situation in each ocean basin is properly covered in each chapter. Regard must also be had to gender balance.
4. Given the above need for writing team involvement, a comprehensive annotated Outline therefore cannot be provided at this stage. The Group of Experts is not in a position to anticipate how the convenors and members of the writing teams will propose to develop the themes specified in the approved Outline.
5. With the agreement and input of the other members of the Group of Experts, the Joint Coordinators have therefore agreed to present this note, setting out their views as to the likely development of the Outline, so as to provide a basis for discussion at the eleventh meeting of the Ad Hoc Working Group of the Whole on the future development of the Outline. The note is set out under the chapter and section headings specified in bold type in the approved Outline, since the Outline provides that “these would be taken into the structure of the second world ocean assessment”. Where the approved Outline sets out section headings other than in bold type, these have not all (for brevity) been reproduced in this note. The chapters, however, will definitely cover all the fields specified in such headings, although the structure of the headings will not necessarily be followed.
5. In addition, the Group of Experts has developed a template for the chapters of the second world ocean assessment, expanding the guidance given in the initial “Background to the Outline of the Second World Ocean Assessment”. This is attached at Annex A. It will be revised from time to time in the light of experience gained. Moreover, the list of the Lead members and Co-Lead members for the chapters of the Outline of the second world ocean assessment, also developed by the Group of Experts, is attached at Annex B.
6. As stated in the approved Outline, each chapter (or each section of each chapter), other than chapters 1- 4, would include:

¹ A/73/74.

- (a) A one-paragraph abstract of the chapter or section;
- (b) A very short summary of the situation recorded in World Ocean Assessment I;
- (c) A description of environmental changes between 2010 and 2020;
- (d) A description of the economic and social consequences and/or of the other economic or social changes (including, where appropriate, changes in global distribution of benefits and disbenefits and issues related to concepts of natural capital);
- (e) A description of the main information gaps in relation to the subject matter;
- (f) A description of the main capacity-building gaps in the field.

7. Again, as set out in the approved Outline, where appropriate, each chapter or section would review separately the situation in the various ocean regions (Arctic, North Atlantic, South Atlantic, Indian Ocean, North Pacific, South Pacific and Southern Ocean).

8. Finally, as set out in the approved Outline, where appropriate, each chapter will contain an explicit evaluation of how the developments described in the chapter are contributing to the achievement of relevant Sustainable Development Goals (SDGs). The writing team for each chapter will be asked to consider the SDGs thus identified that are relevant to their chapter, and whether any further SDGs need to be considered in that chapter. Chapter 1 (Overall Summary) will include an overview of these evaluations for all relevant SDGs.

Part 1: Summary

Chapter 1: Overall Summary

This chapter will be developed by the Group of Experts collectively, under the leadership of the Joint Coordinators. In particular, it will focus on issues relevant to the 2030 Agenda for Sustainable Development, including those highlighted in the Technical Abstract of World Ocean Assessment I relating to that Agenda.

Part 2: Introduction

Chapter 2: Approach to the assessment

Sections (a) (Purpose of assessment) and (b) (Purpose of assessment) of this chapter are largely sketched out in the approved Outline, some of it with full text. It will be developed to fill out the full text of the remaining parts specified in the Outline.

Section (c) (Further detail on the DPSIR approach and ecosystem services) will provide an overview of the DPSIR framework and the latest developments in the use of the framework. It will also provide an update on understanding of ecosystem services provided by the marine environment, building on the baselines provided in Chapters 4 – 9 of the first assessment.

Chapter 3: Scientific understanding of the ocean

This chapter covers the fundamental basis for the rest of the assessment. In developing the chapter, consideration will be given to the first Global Ocean Science Report (published by UNESCO/IOC in 2017) and the decision of the United Nations General Assembly in December 2017 to proclaim the United Nations Decade of Ocean Science 2021 – 2030 (A/RES/72/73). The Outline specifies that it should cover recent step-change improvements in understanding the ocean, including: physical and chemical properties of the ocean; ocean bathymetry; ocean circulation; effects on biota of anthropogenic noise; and sources of marine debris. In the light of the remit of the Regular Process, it will also need to consider whether there has been comparable progress in understanding economic and social aspects of the ocean.

Part 3: Drivers of changes in the marine environment

Chapter 4: Drivers

A substantial amount of work has been done on issues relating to how to define “drivers” and what is

driving environmental, economic and social changes in the world's environment in the Global Assessment under the Intergovernmental Platform on Biodiversity and Ecosystem Services (IPBES). This chapter will need to take account of this work as well as other work detailing the planetary socio-economic changes that are driving change in the marine environment. The sections included in this chapter (as approved) include:

- (a) Developments in human population (especially populations in coastal areas);
- (b) Development aspirations;
- (c) Food security and food safety;
- (d) Resource use (including demand for metals and hydrocarbons and the use of marine genetic resources);
- (e) Energy;
- (f) Transport;
- (g) Leisure and recreation
- (h) Drive to sustainability (including the Sustainable Development Goals (SDGs));
- (i) Cultural needs and aspirations;
- (j) Contributions from improved technologies.

Part 4: Current state of the marine environment and its trends

The structure of the approved Outline for the second world ocean assessment is significantly different from that for World Ocean Assessment I. This is to meet the wishes, expressed in the first round of regional workshops, that the second assessment should follow more closely the DPSIR approach and to provide an update on any changes to the baselines set out in the first assessment. Part 4 therefore concentrates on changes to the **state** of various aspects of the ocean, while Part 5 looks at changes to key **pressures** that are leading to the changed states of those aspects.

Chapter 5: Trends in the physical and chemical state of the ocean

The sections within this chapter are well-recognised specialisms within the general discipline of oceanography, and the relevant writing teams will need to evaluate what developments in the state of these disciplines can be regarded as the “step-changes” since the baseline set out in World Ocean Assessment I, to which the approved Outline refers. The potential overlaps in describing change in the physical and chemical state of the ocean with Chapter 9 where the pressures from changes in the climate and associated changes since the first assessment will need to be considered.

- (a) Sea temperature;**
- (b) Sea levels;**
- (c) Salinity;**
- (d) Ocean circulation;**
- (e) Sea ice;**
- (f) Ocean chemistry, including ocean acidification;**
- (g) Dissolved oxygen.**

These are well-recognised specialisms within the general discipline of oceanography, and the relevant writing team(s) will need to evaluate what developments in the state of these disciplines can be regarded as the “step-changes” since the baseline set out in World Ocean Assessment I, to which the approved Outline refers. Together with chapter 9, this chapter will be an appropriate place in which to up-date information on issues identified in the Technical Abstract of World Ocean Assessment I on the Impacts of

Chapter 6: Trends in the biodiversity of main taxa of marine biota

As the approved Outline provides, biodiversity of taxa will be described in terms of abundance, distribution, productivity and diversity within the taxon. Separate writing teams will be needed for many of the sections of this chapter and it is likely that in order to consider the vast diversity of species within each, each section of the chapter will need to be further subdivided on the basis of major taxonomic groups. In addition to the specific chapters on species of concern in World Ocean Assessment I, many of these taxa were described in that Assessment in the regional chapters on the seven ocean basins and the open ocean deep sea. The descriptions here will bring together the global description with regional observations as appropriate, in fulfilment of the guidance on regional aspects in the approved Outline.

- (a) **Plankton:** As in Chapter 6 of World Ocean Assessment I, this section will need to consider net primary production in the ocean as well as other components of the plankton community and the various factors that are driving any changes observed from the baseline identified in the first assessment and the implications of these changes for society.

It will be for consideration whether issues such as the impact on primary production and plankton of micro- and nano-particles of plastic and other substances (such as titanium dioxide) are better considered here or in the chapters on the inputs of hazardous substances and solid waste. In World Ocean Assessment I, they were considered in conjunction with primary production.

The section is also to consider the state of microbes and viruses in the ocean, noting that the absence of a thorough consideration of microbes and viruses was a point of criticism of World Ocean Assessment I. It is therefore likely to be necessary to provide material on these taxa in order to give the baseline, which was missing from World Ocean Assessment I. In the Regional Workshop for the North Pacific (Palau, 8 – 9 August 2018), it was proposed that the description of “microbes and viruses”, would be better “bacteria and viruses”.

- (b) **Marine invertebrates:** These taxa were considered in World Ocean Assessment I in the eight regional chapters 36A – 36H. This section of chapter 6 will therefore bring together the information on regional aspects of the current state of marine invertebrates in the one place. Any potential overlaps in describing change in the state of marine invertebrates in relation to the factors driving those changes to be described in Chapter 15 (Capture fisheries and harvesting of wild marine invertebrates) will be considered along with that chapter.
- (c) **Fish:** As with marine invertebrates, this chapter will bring together information that was covered across the regional chapters in the first assessment (36A – 36H). It will also be necessary for this section to include the developments in respect of sharks, other elasmobranchs, tuna and billfish, which were covered by separate chapters (Chapters 40 and 41). Again, the potential overlaps in describing change in biodiversity of fish, particularly in relation to the factors driving those changes with Chapter 15 where the pressures from changes in capture fisheries will need to be considered.
- (d) **Marine mammals:** This section will provide an update on changes from the baselines provided in Chapter 37 of the first assessment.
- (e) **Marine reptiles:** This section will provide an update on changes from the baselines provided in Chapter 38 of the first assessment.
- (f) **Seabirds:** This section will provide an update on changes from the baselines provided in Chapter 38 of the first assessment.

- (g) **Marine plants:** The state of biodiversity of marine plants were considered in Chapters 47 – 49 and to a lesser extent in the regional chapters (36A – 36H) of the first assessment. This chapter will therefore bring together the information on regional aspects of the current state of marine plants in the one chapter. The potential overlaps in describing change in the state of marine plant biodiversity with Chapter 7 where changes in the state of seagrass meadows, mangroves and salt marshes since the first assessment will need to be considered.
- (h) **Macroalgae:** In World Ocean Assessment I, the state of macroalgae were considered mainly in the chapter that included baselines for kelp forests and seagrass meadows. It is now intended include the broader taxa of macroalgae in a section of Chapter 6 that is separate from other marine plants, recognising the broader taxonomic diversity of macroalgae. The state of the floating species of *Sargassum* macroalgae will be considered with the habitat of the Sargasso Sea, given the integral contribution the species makes to that habitat.

Chapter 7: Trends in the state of biodiversity in marine habitats

As the approved Outline provides, changes in the state of biodiversity in marine habitats will be described in terms of diversity, abundance, distribution and productivity and what the implications of change might mean for habitat functioning and provision of ecosystem services. Baselines for the first four sections of this chapter were described the eight regional chapters 36A – 36H. The section of Chapter 7 will allow for changes in each of the habitats to be clearly articulated in distinct sections and where global baselines were not provided in the first assessment, provide these in the second assessment.

- (a) **Sand and mud substrates (soft bottom):** The potential overlaps in describing change in the state of sand and mud substrate biodiversity with other habitat sections, particularly island lagoons, estuaries and deltas and seagrass meadows will need to be considered.
- (b) **Rocky substrates and reefs:** The potential overlaps in describing change in the state of rocky substrate and reef biodiversity with other habitat sections, particularly the two sections on corals and the section on intertidal zones will need to be considered
- (c) **Intertidal zone:** The potential overlaps in describing change in the state of intertidal zone biodiversity with other habitat sections, particularly rocky substrates will need to be considered.
- (d) **Atoll and island lagoons:** The potential overlaps in describing change in the state of atoll and island lagoon biodiversity with other habitat sections, particularly sand and mud substrates and tropical coral reefs will need to be considered.
- (e) **Tropical and sub-tropical coral reefs:** The recognised and well reported rapid change in these habitats will need to be related to the baseline provided in Chapter 43 of World Ocean Assessment I.
- (f) **Cold-water corals:** This section will need to describe the developments from the baselines described in Chapter 42 of World Ocean Assessment I.

The following six sections represent an attempt to develop a more rational structure for describing coastal habitats from that provided in the first assessment. They will largely build on the baselines provided in Chapters 44, 47, 48 and 49, together with part of Chapter 51 (in which submarine features were described) of World Ocean Assessment I. Habitats associated with algal species have been separated from seagrass meadows and the diversity of communities associated recognised by expanding the discussion of changes in biodiversity to include algal beds as well as kelp forests. The unique communities associated with submarine canyons have also been recognised as a distinct point of discussion. The Regional Workshop for the North Pacific (in Palau on 8 – 9 August) suggested that the section on submarine canyons should also include continental slopes. Particular considerations for overlaps with other sections of the chapter are detailed individually.

- (g) **Estuaries and deltas:** The potential overlaps in describing change in the state of estuary and delta biodiversity with sand and mud substrates and mangroves will need to be considered.
- (h) **Kelp forests and algal beds:** The potential overlaps in describing change in the state of kelp forest and algal bed biodiversity with rocky substrates and reef biodiversity will need to be considered.
- (i) **Seagrass meadows:** The potential overlaps in describing change in the state of seagrass meadow biodiversity with sand and mud substrates and estuary and delta biodiversity, will need to be considered.
- (j) **Mangroves:** The potential overlaps in describing change in the state of mangrove biodiversity with estuary and delta biodiversity, will need to be considered.
- (k) **Salt marshes:** The potential overlaps in describing change in the state of salt marsh biodiversity with the intertidal zone will need to be considered.
- (l) **Submarine canyons:** As noted above, the Regional Workshop in Palau has proposed that this should be extended to cover the continental slopes as well.
- (m) **High-latitude ice** (including that over areas of open ocean): This section will build on the baseline provided in Chapter 46 of World Ocean Assessment I. It will also need to build on the baselines provided in Chapters 36G and 36H (Arctic and Southern Oceans). Outputs from the monitoring programs of the Arctic Council and CCAMLR and the research programmes Integrating Climate and Ecosystem Dynamics in the Southern Ocean (ICED), Ecosystem Studies of Subarctic and Arctic Seas Search (ESSAS) and the Scientific Committee on Antarctic Research (SCAR) will provide important inputs into this section.
- (n) **Seamounts and pinnacles:** This section will build on the baselines provided in Chapter 51 of the first assessment as well as information provided in the regional chapters (36A – H).

The following three sections represent an attempt to develop a better structure for dealing with the features of the ocean beyond the geophysical continental shelf. This revised structure is necessary to avoid the unsatisfactory features where some aspects were dealt with in both Chapter 36F and Chapter 51 of the first assessment, by different writing teams. These sections will be an appropriate place to build on the baselines and issues identified in the Technical Abstract of World Ocean Assessment I on the Conservation and Sustainable Use of Marine Biological Diversity of Areas Beyond National Jurisdiction.

- (o) **Abyssal plains**
- (p) **Open ocean**
- (q) **Ridges, plateaus and trenches**
- (r) **Hydrothermal vents and cold seeps:** This section will build on the baselines provided in Chapter 45 of the first assessment as well as information provided in the regional chapters (36A – H).
- (s) **Sargasso Sea:** The Sargasso Sea is a unique ecosystem, which is best studied and described as a unit. This will probably also be the best place to consider the problems of the floating mats of *Sargassum* that have been affecting both Caribbean islands and West African States.

Chapter 8: Trends in the state of human society in relation to the ocean

In World Ocean Assessment I, the aspects of human society related to the ocean were described in relation to the human activities that impact on the marine environment. In contrast to this, the approved Outline requires a survey of the state of human society under four headings. These will build on the baselines provided across a number of themes that are described in various chapters of World Ocean Assessment I. Identifying the changes in states associated with the four sections of this chapter will provide a more coherent picture of the socio-economic and cultural aspects of the marine environment. Overlaps and synergies with other chapters of the second assessment (e.g. those dealing with pollution and hazardous substances, shipping, fisheries) will need to be considered. Currently the Pool of Experts contains experts identified as having expertise across the four sections of this chapter, but may not yet contain a sufficient range of experts to deal with this chapter:

- (a) **Coastal communities**, including the coastal population, the size of coastal communities, their wealth/income, their vulnerability, adaptability, and dependency on the ocean (including dependence on, and engagement, with marine resources):

This section would bring together important aspects of the way in which human communities relate to the ocean. In World Ocean Assessment I, these aspects are scattered in a number of chapters, and therefore do not present a coherent picture.

- (b) **Human health as affected by the ocean**, including the health of coastal communities relative to inland communities, the effects of exposure to contaminated seawater, the scale of beach closures for health reasons, and the extent to which food resources available from the sea create health problems through their content of hazardous substances (including metals, microplastics and nanoparticles) and pathogens:

This section would largely update various sections of Chapter 20 (Land-based Inputs) of World Ocean Assessment I, but would also expand some of the material in Chapter 6 (Primary production).

- (c) **Maritime industries**, including their economic performance, the role of freight transport in international trade, the role of ferries and coastwise shipping in internal transport; recruitment of workers, the proportion of their workers who are women, the rates of death of, and injury to, those working in them, the protection of their working conditions, their levels of pay, maritime security, human trafficking, forced labour, which has also been referred to as “modern slavery” and smuggling, access to markets and handling facilities for fisheries produce and the proportion of fisheries which are artisanal, culture- related or conducted by indigenous peoples:

This section will show developments in relation to a number of issues related to maritime industries discussed in various chapters of World Ocean Assessment I, including the social aspects of fisheries (Chapter 15), fishing vessels (Chapter 17), maritime transport (Chapter 17), and the coastal infrastructure and social aspects of tourism industries (Chapter 27).

- (d) **Maritime cultural services**, including the extent to which marine cultural resources are conserved, support for cultural activities linked to the sea, and the scale of use of objects from the sea valued for cultural reasons.

This section would update most of the material in Chapter 8 (Aesthetic, cultural, religious and spiritual ecosystem services derived from the marine environment).

Part 5: Trends in pressures on the marine environment

The approved Outline provides that each chapter/section in this Part should include discussion of: (a) the impacts both on marine biota and habitats and on humans, (b) management measures (both

adaptive and mitigatory) taken in response, and (c) the interplay between all terrestrial ecosystems (including mountain, hill, lowland and coastal ecosystems) and the ocean.

Chapter 9: Pressures from changes in climate and atmosphere

This chapter has clear linkages with Chapter 5, where the state of the physical and chemical aspects of the ocean will be detailed. The potential overlaps and synergies between the two chapters will need to be considered as a result. While pressures impacting the physical and chemical state of the ocean were not dealt with via a specific chapter in the first assessment, some aspects were detailed in Chapters 4 and 5 of the first assessment. The IPCC special report on the oceans and cryosphere will be prepared in parallel to World Ocean Assessment 2 (it is due to be completed in September 2019). The next IPCC regular report (AR6) will not be completed until the first half of 2022. This chapter will therefore need to follow the IPCC material as it is produced, relying on the relevant literature rather than directly on IPCC reports. In addition, the outputs from the 18th meeting of the United Nations Open-ended Informal Consultative Process on Oceans and the Law of the Sea (ICP) which focused its discussions on the topic of “Effects of Climate Change on the Oceans” (held in 2017) will be informative for this chapter. This chapter will also be an appropriate place in which to up-date information on issues identified in the Technical Abstract of World Ocean Assessment I on the Impacts of Climate Change and Related Changes in the Atmosphere on the Ocean. This chapter will comprise the following sections:

- (a) **Physical properties of the ocean:** including changes in circulation and factors driving circulation including, heat and stratification
- (b) **Ocean chemistry:** including salinity, carbon and nutrient cycling and ocean acidification
- (c) **Extreme climate events:** including changes in the interplay between climate change and natural climate phenomena

Chapter 10: Changes in inputs to the marine environment of nutrients

This chapter will build on the baselines provided in Chapter 20 in World Ocean Assessment I, which included a regional survey of what was known at the time about nutrient inputs and their effects. This may include outputs from new regional assessments reported to be being conducted by Regional Seas Organisations in the eastern Indian Ocean and the South-East Pacific, as well as from regions with established monitoring systems.

Chapter 11: Changes in liquid and atmospheric inputs to the marine environment from land (including through groundwater), ships and offshore installations

This chapter will provide an update on the baselines provided by Chapter 20 of World Ocean Assessment I. It also brings together updates on baselines relating to offshore installations (which were detailed in Chapter 21) and shipping (which were detailed in Chapter 17) into the one chapter, in order to provide a more comprehensive overview of changes in liquid and atmospheric inputs. Given the specificities associated with each of the sections within this chapter (listed below), separate writing teams may be needed to provide an update on each section.

- (a) Persistent organic pollutants;
- (b) Metals;
- (c) Radioactive substances (including naturally occurring radioactive material (NORM));
- (d) Personal care products, pharmaceuticals and nutraceuticals;
- (e) Atmospheric pollutants;
- (f) Hydrocarbons;
- (g) Other substances used on, and discharged from, offshore installations;
- (h) Distribution of, and trends in, contaminant concentrations;

Chapter 12: Changes in inputs and distribution of solid waste in the marine environment (other than dredged material)

This chapter will also provide an update to the baselines provided in Chapter 24, dealing with the regular use of the ocean as a place for the disposal of solid waste. However, there is a partial and declining fulfilment of reporting obligations under the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter 1972, and its 1996 Protocol. Without better reporting, the second world ocean assessment will have difficulty in dealing with this aspect of this chapter.

It will also provide an update on the baseline provided by Chapter 25 (Marine debris) of World Ocean Assessment I. The input of plastics (including micro- and nano-plastics) into the marine environment has become a much more high-profile issue than it was when that chapter was written. The chapter will cover activities resulting in marine debris, including plastics, abandoned fishing gear, microparticles and nanoparticles and estimates of the sources both from land, ships and offshore installation. It will draw on associated research on developing regional and global baselines. The outputs from the 17th meeting of the ICP which focused its discussions on the topic of “Marine Debris, plastics and microplastics” (held in 2016) will be informative for this chapter.

Chapter 13: Changes in erosion and sedimentation

This chapter will provide an update to baselines provided in Chapter 26 (Land/Sea Interaction) of World Ocean Assessment I. It has become increasingly clear that the management of inland areas (particularly in relation to forest clearance and the creation of dams) can have a significant impact on the marine environment, through the increase or reduction in the sediment carried by watercourses to the sea. The absence of, or the increase in, the replenishment of sediment can significantly affect the coastal zone and its environment. Overlaps and synergies with Chapter 9 particularly in association with changes in sea level and intensity of storm events will need to be considered.

Chapter 14: Changes in coastal and marine infrastructure

This chapter will provide an update on baselines provided across several chapters of World Ocean Assessment I including Chapter 18 (Ports), Chapter 19 (Submarine cables and pipelines), Chapter 26 (Land/Sea Interaction) and Chapter 27 (Tourism and recreation). Bringing content dispersed across these chapters in the first assessment will provide a coherent and comprehensive picture of the pressure that developments in marine infrastructure are having on the marine environment. Specifically (as approved) the chapter will cover:

- (a) Amounts of land reclaimed from the sea;
- (b) Extent of new land defences against the sea, and extent of sea defences abandoned;
- (c) Extent of coastal development, including development for tourism;
- (d) Other adaptations affecting coastal populations as a result of sea-level rise;
- (d) Changes in port installations and their management, including dredging.
- (e) Changes in submarine cables and submarine pipelines.

Chapter 15: Changes in capture fisheries and harvesting of wild marine invertebrates

This chapter will build on the baselines provided in Part IV of World Ocean Assessment I, gave an overview of the situation on food security and food safety in relation to food from the sea. This chapter is intended to up-date that overview in relation to levels of catches of fish, shellfish and other invertebrates, both within and beyond areas of national jurisdiction, and through commercial fisheries, artisanal (otherwise called small-scale) and subsistence fisheries. The Joint Coordinators consider that this should include more detail on the situation in the different ocean basins – Part IV concentrated mainly on the global picture, and there is a need to update those information on

fisheries and harvesting included in the regional chapters (36A – H) in the first assessment in order to capture regional specificities.

It will also need to consider the levels of by-catch and other impacts on vulnerable marine ecosystems and benthic ecosystems, the levels of post-harvest loss, the levels of fish-stock propagation, and the use of marine protein in agriculture and aquaculture. It will also need to review estimated levels of illegal, unregulated and unreported (IUU) fisheries and the levels of non-food harvesting (for example, for feedstocks for terrestrial stock-rearing). Given the broad range of fisheries and harvesting practices, a number of writing teams dealing with specific components of the chapter may be needed.

Chapter 16: Changes in aquaculture

Aquaculture (including mariculture) is a fast-growing activity within the marine environment. This chapter will need to up-date the baseline information in Chapter 12 of World Ocean Assessment I.

Chapter 17: Changes in seaweed harvesting and use

This chapter will need to up-date the information in Chapter 14 (Seaweeds) of World Ocean Assessment I. The overview of the state of the marine macroalgae will be dealt with in chapter 6(h), as explained above. This chapter will therefore need to focus specifically on human uses of seaweed.

Chapter 18: Changes in desalination and in the production of sea salt

Chapter 28 of World Ocean Assessment I reviewed the use of the desalination of sea water to provide freshwater, and showed the importance of this process for the Gulf States and some islands such as Malta, Okinawa and Singapore. No experts in this field have yet been appointed to the Pool of Experts. This chapter will also need to up-date the material in Chapter 8 of World Ocean Assessment I on marine salt production.

Chapter 19: Changes in seabed mining

This chapter will up-date Chapter 23 (Offshore mining) of World Ocean Assessment I. It will be important for the writing team for the chapter to consider updates in information from countries where mining within areas of national jurisdiction is significant, particularly in the “tin belt” in South-East Asia and in areas where mining in areas beyond national jurisdiction is starting.

Chapter 20: Changes in hydrocarbon exploration and extraction

This chapter will provide an up-date on Chapter 21 of World Ocean Assessment I. Issues relating to discharges and noise from this sector will now be dealt with in the chapters relating to those issues. It will be necessary for this chapter to consider in more detail the decommissioning of offshore installations which have reached the end of their useful life, since this issue will become more significant as more offshore oil and gas fields reach the end of their productive lives.

Chapter 21: Trends in inputs of anthropogenic noise to the marine environment

Inputs of anthropogenic noise into the marine environment were only considered in the first assessment under the chapters dealing with shipping and offshore hydrocarbon industries. Noise inputs are derived from many more sources than these two sectors. There has been an explosion in information on the measurement of inputs and their associated impacts over the last two decades, together with improved understanding of its effects across all species – see chapter 3). This chapter will therefore provide the opportunity to provide a more comprehensive and coherent treatment of this pressure. For those aspects where global baselines were not provided in the first assessment, these will be provided. The outputs from the recent 19th meeting of the ICP which focused its discussions on the topic of “Anthropogenic Underwater Noise” will be informative for this chapter.

Chapter 22: Developments in renewable energy sources

This chapter will provide an up-date Chapter 22 (Other marine-based energy industries) dealing with renewable energy sources in World Ocean Assessment I. Currently, the Pool of Experts, although containing a number of experts with expertise in renewable energy sources, does not cover the whole

spectrum of renewable energy technologies and their environmental and economic impacts.

Chapter 23: Developments in marine transportation

This chapter will provide an update to the baselines provided in Chapter 17 (Shipping) of World Ocean Assessment I. Some of the baselines provided by that chapter (pollution, noise, and economic and social aspects) will be included in other chapters: chapter 8(c) (Maritime industries); chapter 10 (Nutrient inputs from ships' sewage); chapter 11 (Land-based inputs other than nutrients); chapter 21 (Noise); and chapter 25 (Invasive species)

Chapter 24: Developments in tourism and recreation activities

This chapter will provide an update to the baselines provided in Chapter 27 (Tourism and recreation) of World Ocean Assessment I. Some aspects of that chapter will be considered elsewhere in the second world ocean assessment 2 – especially the employment aspects in chapter 8 and tourist infrastructure in chapter 14.

Chapter 25: Invasive species

Invasive species were only dealt with in Chapter 17 (Shipping) of World Ocean Assessment I which discussed them in relation to their transport by shipping and the resulting distribution of invasive species. This chapter will allow for a more comprehensive discussion of current understanding on marine invasive species, including transport in ballast water and on ships' hulls, the drivers of their distribution and establishment and their impacts on ecosystems.

Chapter 26: Developments in exploration and use of marine genetic resources

Chapter 29 (Use of marine genetic resources) in World Ocean Assessment I explained the background to the exploration and research into the use of marine genetic resources, but noted that (in spite of the considerable potential in this field) there was only limited success in applying them to practical uses. This chapter will update the baseline provided by that chapter and will consider the current discussions on aspects the use of marine genetic resources in the negotiations on an international instrument on biodiversity in areas beyond national jurisdiction (BBNJ).

Chapter 27: Marine hydrates – a potentially emerging issue

Investigations have shown that there are large amounts of marine hydrates (compounds of methane and water) form in the marine environment, and that these have the potential to provide new energy sources. However, their decomposition and release can lead to a decrease the stability of seabed and significant increases in methane contributions to greenhouse gases. At present the constraints of pressure and temperature prevent them both being released and being an economically viable prospect for extraction. Changes in ocean temperatures associated with climate change have the potential to relax those constraints. This chapter will cover this topic for the first time and therefore will need to provide a baseline on current understanding and outlooks for their potential release and/or use.

Chapter 28: Cumulative impacts

It is increasingly being acknowledged that management of marine environments needs to be integrated in such a way to quantify and manage the cumulative nature of impacts from the multiple sectors utilising marine environments (economic, social, cultural). Coverage of this topic in the first assessment was limited and dispersed across some of the regional chapters (Chapters 36A – H) and some of the summary chapters (e.g. Chapter 54). Much research has been done on this theme in the last decade. This chapter therefore needs to summarise this research and provide a comprehensive baseline on current understanding, particularly of approaches to quantifying impacts across sectors and jurisdictions and outputs from those assessments.

Part 6: Trends in management approaches to the marine environment

World Ocean Assessment I did not contain a discussion of management approaches in general to the marine environment, partly because of the instruction not to carry out any policy analysis. However, it is clear that many of the frameworks and approaches that have been developed for management of

human activities in the ocean are relevant to the ocean assessment and there is merit in identifying these and ongoing developments in the science associated with the varying approaches. It is therefore appropriate to consider current understanding associated with the various management approaches aimed at limiting or mitigating pressures from human activities on the ocean.

Chapter 29: Developments in marine spatial planning

The techniques of marine spatial planning are being increasingly being applied by many countries within national jurisdiction. This chapter will provide a baseline of current approaches in the spatial planning of human activities. The outputs from the UNESCO/IOC marine spatial planning programme, as well as the various regional programmes (e.g., under ICES) will inform this chapter. This chapter will need to review the various techniques that are being used for this purpose in the context of the various national legal structures in order to demonstrate the crucial questions that need to be considered if marine spatial planning is to be applied.

Chapter 30: Developments in management approaches

In addition to marine spatial planning, which is important in reconciling potential conflicts between different sectors, a range of management approaches are being applied within and across sectors in the marine environment, aimed at ensuring that uses of the marine environment are sustainable. This chapter will provide a baseline of management approaches and frameworks, current research associated with the development of particularly integrated approaches to management and their regional application. Specifically (as approved) the chapter will cover:

- (a) Ecosystem-based management approaches;
- (b) Culturally-based management approaches;
- (c) Community-based management approaches;
- (d) Area-based management tools, including marine protected areas and special areas (such as special areas under the Convention on Marine Pollution from Shipping (MARPOL) and Particularly Sensitive Sea Areas)
- (e) Adaptation to climate change and resilience building.

Chapter 31 Developments in the understanding of overall benefits from the ocean to humans

This chapter will provide an update to the baselines provided in Chapter 55 (Overall value of the ocean to humans) of World Ocean Assessment I, including the distribution of those benefits, and the role in safeguarding those benefits of improved implementation of international law as reflected in the United Nations Convention on the Law of the Sea. In particular the chapter will provide an update on current understanding of the services provided by the ocean, economic valuation of those services and any developments associated with preserving and enhancing those benefits, including implementation of international law as reflected in UNCLOS.

Template for chapters for the second world ocean assessment

This template is proposed to be implemented across all chapters. It aims to provide a consistent structure to the chapters of the assessment and ensure that all chapters address the aims of the assessment. It is intended to be high level to ensure its applicability across chapters. Chapters should aim to be a maximum of 9 pages or 3,000 words, and follow the format set out for chapters and provided to writing teams. Chapters should include a maximum of 4 tables (including those set out in this template) and 4 figures. Where a chapter is divided into multiple sections (shown in the Outline in bold type) a maximum of 4 pages for both items 3 and 4 may be used for each section, together with correspondingly more tables. This applies particularly to Chapters 6 and 7. Where the second world ocean assessment will need to include new material to provide a baseline that is not provided by World Ocean Assessment I, a further 4 pages can be allowed. If the writing team for a chapter thinks that a lengthier treatment can be justified, they should discuss with the Lead Member for the chapter in the Group of Experts of the Regular Process, who can seek the agreement of the Group to a larger allocation.

1. Keynote points - a one-paragraph abstract of the chapter or section;

Three to five points summarising the key results from the chapter. The key findings are intended to provide the reader with a rapid and brief understanding of the main findings of the chapter's assessment.

2. Introduction, including a very short summary of the situation recorded in the First Global Integrated Marine Assessment (World Ocean Assessment I)

This should also provide a brief (maximum 1 page) introduction to the topic including

- (a) The scope of the topic so that it is clear what this chapter will cover and what it will not. In particular this section will identify where there are overlaps/interactions with other chapters and how these have been managed/minimised;
- (b) How the topic is affected by and affects other components of the marine system (and where there might be relevant linkages with other chapters);
- (c) How the topic is relevant to human communities and wellbeing (and where there might be relevant linkages with other chapters);
- (d) A brief summary of the baseline state provided in the First Global Integrated Marine Assessment (World Ocean Assessment I);
- (e) Advances in knowledge and capacity that have contributed to the evaluation of the change in state

3. Description of the environmental changes (between 2010 and 2020)

Using the World Ocean Assessment I as a baseline, detail (maximum 4 pages) of the change in state at the global level (and the uncertainty associated with the determination of that change) that has occurred in the topic (driver, pressure, state, response) since the baseline was established. This should be within the context of any established longer-term trend. This section of the chapter should identify clear linkages with other chapters where relevant. This should include:

- (a) Changes in the overall status (which can include physical or biological state);
- (b) Factors associated with the change;
- (c) Impacts of the change on/interactions with other components of the marine system.

4. A description of the economic and social consequences and/or of the other economic or social changes (including, where appropriate, changes in global distribution of benefits and disbenefits and issues related to concepts of natural capital)

A synopsis (maximum 2 pages – or up to 6 pages if section 3 is correspondingly reduced) of social,

economic and cultural aspects associated with any change in state at the global level. This section of the chapter should identify clear linkages with other chapters where relevant. This should include:

- (a) Currently observed consequences
- (b) Implications the change in state might have for achieving the integrated set of global priorities and objectives set out under the Sustainable Development Goals of the 2030 Agenda for Sustainable Development. This should comprehensively include consideration of the interactions between goals and any benefits and trade-offs between the goals (noting that the ocean is relevant to all 17 of the goals²).

5. Key region-specific changes and consequences.

A synopsis (maximum 1 page) of important regional issues or aspects associated with the topic for any one or all (as relevant) of the regions:

- (a) The Arctic Ocean
- (b) The North Atlantic Ocean, the Baltic Sea, the Black Sea, the Mediterranean and the North Sea
- (c) The South Atlantic Ocean and the Wider Caribbean
- (d) The Indian Ocean, the Arabian Sea, the Bay of Bengal, the Red Sea, the Gulf of Aden and the Persian Gulf
- (d) The North Pacific Ocean
- (e) The South Pacific Ocean
- (f) The Southern Ocean

6. Outlook

A synopsis (maximum 1 page) of the outlook for the topic under a business as usual scenario including:

- (a) anticipated outlook for the state of the topic over the near to medium term (~10-20 years)
- (b) ecosystem consequences of continued change in the system
- (c) socio-economic consequences of continued change in the system

7. Key remaining knowledge gaps

A synopsis of remaining knowledge gaps and any regional aspects associated with the theme of the chapter.

8. Key remaining capacity-building gaps

A synopsis of the main remaining capacity-building gaps in the field

Source Table

Each chapter is to provide, as a minimum, a table showing a synopsis of the data and information used for the assessment, supporting transparency in each chapter assessment and allowing for compatibility and comparability of future assessments with the current assessment. (This could also be included as an appendix). This is in addition to any necessary references.

² There are various publications assessing the interactions of the SDGs available including:

ICSU (2017) A guide to SDG interactions: from science to implementation. International Council for Science and Nippon Foundation – Nereus Program (2017). Oceans and sustainable development goals: co-benefit, climate change and social equity. Nereus Program.

Le Blanc, D., Freire, C., Vierros M. (2017) Mapping the linkages between oceans and other Sustainable Development Goals: A preliminary exploration. UN DESA Working Paper No. 149 ((ST/ESA/2017/DWP/149)

DESIGNATIONS OF LEAD MEMBERS AND CO-LEAD MEMBERS

Note by the Joint Coordinators

1. This note sets out the list of the Lead and Co-Lead members for the chapters of the Outline of the second world ocean assessment. It has been revised in the light of
- (a) The conclusions of the Bureau of the Ad Hoc Working Group of the Whole, at its meeting on 24 May 2018, that
 - (i) The Joint Coordinators should be designated as Lead members for Chapter 1 (Summary), with the rest of the Group of Experts as Co-Lead members;
 - (ii) There should be at least one Co-Lead member for every other chapter;
 - (b) The intended appointment of Mr. Henn Ojaveer (Estonia) to the Group of Experts on the nomination of the Eastern European Group;
 - (c) Further comments from members of the Group of Experts.

CH. NO	SHORT DESCRIPTION OF TOPIC	LEAD MEMBER(S)	CO-LEAD MEMBERS
1	Summary	Renison Ruwa and Alan Simcock	Maria Bebiano, Hilconida Calumpong, Sanae Chiba, Marco Espino, Karen Evans, Carlos Garcia-Soto, Osman Keh Kamara, Enrique Marschoff, Michelle McClure, Essam Mohammed, Henn Ojaveer, Chul Park, Ylenia Randrianarisoa, Anastasia Strati, Joshua Tuhumwire, Ca Thanh Vu, Juying Wang, Tymon Zielinski
2	Approach to the Assessment	Alan Simcock	Carlos Garcia-Soto
3	Scientific Understanding	Renison Ruwa	Sanae Chiba, Carlos Garcia-Soto, Tymon Zielinski
4	Drivers	Renison Ruwa	Osman Keh Kamara
5	Ocean physical & chemical state	Carlos Garcia-Soto	Karen Evans, Juying Wang, Tymon Zielinski
6	Biota diversity	Chul Park	Hilconida Calumpong, Karen Evans, Michelle McClure
7	Habitat diversity	Hilconida Calumpong	Sanae Chiba, Karen Evans, Michelle McClure, Enrique Marschoff, Renison Ruwa, Joshua Tuhumwire
8	Human society	Alan Simcock	Osman Keh Kamara, Essam Mohammed, Anastasia Strati

9	Climate pressures	Karen Evans	Sanae Chiba, Carlos Garcia-Soto, Michelle McClure, Ca Thanh Vu
10	Nutrient pollution	Juying Wang	Maria Bebiano
11	Chemical pollution	Maria Bebiano	Alan Simcock, Juying Wang
12	Solid waste	Maria Bebiano	Ca Thanh Vu, Juying Wang
13	Sedimentation	Ca Thanh Vu	Joshua Tuhumwire
14	Infrastructure	Ca Thanh Vu	Alan Simcock
15	Capture fisheries	Michelle McClure	Karen Evans, Enrique Marschoff, Essam Mohammed, Ylenia Randrianisoa
16	Aquaculture	Enrique Marschoff	Renison Ruwa
17	Seaweed	Hilconida Calumpong	Renison Ruwa
18	Salt	Alan Simcock	Carlos Garcia-Soto
19	Seabed mining	Joshua Tuhumwire	Maria Bebiano, Anastasia Strati
20	Offshore hydrocarbons	Joshua Tuhumwire	Alan Simcock
21	Noise	Karen Evans	Carlos Garcia-Soto
22	Renewable energy	Anastasia Strati	Carlos Garcia-Soto, Osman Keh Kamara
23	Shipping	Alan Simcock	Osman Keh Kamara
24	Tourism	Alan Simcock	Anastasia Strati
25	Invasive species	Chul Park	Henn Ojaveer, Renison Ruwa
26	Marine genetic resources	Sanae Chiba	Hilconida Calumpong
27	Marine hydrates	Alan Simcock	Carlos Garcia-Soto, Joshua Tuhumwire
28	Cumulative impacts	Karen Evans	Essam Mohammed, Alan Simcock
29	Marine spatial planning	Alan Simcock	Karen Evans, Ca Thanh Vu
30	Management approaches	Anastasia Strati	Hilconida Calumpong, Karen Evans, Essam Mohammed, Ca Thanh Vu,
31	Overall benefits	Essam Mohammed	Osman Keh Kamara, Anastasia Strati
	Infographics	Sanae Chiba	