These were held in:

(i) Koror, Palau, in August 20a18, for the North Pacific Ocean where the following chapters were considered: Chapter 6 (species biodiversity), Chapter 7 (habitat biodiversity), Chapter 10 (nutrient inputs), Chapter 13 (erosion and sedimentation), Chapter 14 (coastal and marine infrastructure), Chapter 15 (capture fisheries), Chapter 25 (invasive species), and Chapter 29 (marine spatial planning);

(ii) Valetta, Malta, in August 2018, for the North Atlantic Ocean and adjacent seas where the following chapters were considered: Chapter 6 (species biodiversity), Chapter 8 (human society and the ocean), Chapter 11 (liquid and atmospheric inputs), Chapter 15 (capture fisheries) and Chapter 26 (marine genetic resources);

(iii) Odessa, the Ukraine, in October 2018, ,1 0 018,iodiversityi7(2(an3)-4(adj)-2(ace)4(nt)-[ )]TJETQq

(marin g)

(j) Subsequent steps: The finalized text and responses were submitted b y the secretariat to the Bureau of the Ad Hoc Working Group and circulated to Member States on 17 August 2020.

3. There is now a period for Member States to raise outstanding issues on the revised draft. According to the Revised Timetable and Implementation Plan, this should end by 14 September 2020,

environment, including the establishment of marine protected areas and, in some regions, improved management of pollution and fisheries. However, many pressures from human activities continue to degrade the ocean, including important habitats including for example, mangroves and coral reefs. Pressures include those associated with climate

PART 1: SUMMARY

Chapter 1: Overall Summary

Our understanding of the ocean continues to improve. Innovations in sensors and autonomous observation platforms have substantially increased observations of the ocean. Regional observation programmes have been promoted and have enabled better coordination and integration of efforts.

Some aspects

ocean and, as a consequence, there is a lack of focused, sustained and publicly accessible observations of these aspects of marine systems in standardized formats at regional and global scales.

PART 3: DRIVERS OF CHANGE IN THE MARINE ENVIRONMENT

Chapter 4: Drivers

Drivers that have the greatest influence on the marine environment and its sustainability are:

(iv) changing governance structures and geopolitical instability; and (v) climate change.

The relationships between drivers and pressures (and their impacts) are complex and dynamic, with interlinkages between drivers leading to cumulative interactions and effects of pressures.

Drivers vary regionally as a result of global variability in population distribution and demographics, the degree of economic development, technological capacity and the uneven effects of climate change and, as a result, human activities and pressures vary globally; most notable differences are between temperate and tropical regions and developed and least developed regions.

Integrated frameworks, within which scenarios can be explored that include changes to populations and economies, governance structures and the effects of climate change on maritime industries and the environment
approaches, are needed for identifying sustainable ocean use.

PART 4: CURRENT STATE OF THE MARINE ENVIRONMENT AND ITS TRENDS

Chapter 5: Trends in the Physical and Chemical State of the Ocean

Ocean warming, together with land ice melt, are the main causes of the accelerating global rise in the mean sea level.

Global warming is also affecting many circulation systems. The Atlantic Meridional Overturning Circulation (AMOC) has already weakened and will most likely continue to do so in the future. The impacts of ocean circulation changes include a regional rise in sea levels, changes in the nutrient distribution and carbon uptake of the ocean, and feedbacks with the atmosphere.

oceans exhibit robust warming since the 1950s from the surface down to 2000m. The rate of ocean heat content has more than doubled since the 1990s as compared with long-term trends. Ocean warming can be seen in most of the global ocean, with a few regions exhibiting long-term cooling.

The ocean shows a marked pattern of salinity changes during the multi-decadal observations, with surface and subsurface patterns providing clear evidence of a water cycle amplification over the ocean. This manifests in enhanced salinities in the near-surface, high-salinity subtropical regions, and freshening in the low-salinity regions such as the West Pacific Warm Pool and the poles.

An increase in atmospheric carbon dioxide levels, and a subsequent increase in carbon in the oceans, has changed the chemistry of the oceans to include changes to pH and aragonite saturation. A more carbon-enriched marine environment, especially when coupled with other environmental stressors, has been demonstrated through field studies and experiments to have negative impacts on a wide range of organisms, particularly those that form calcium carbonate shells, and alter biodiversity and ecosystem structure.

Decades of oxygen observations allow for robust trend analyses. Long-term measurements have shown decreases in dissolved oxygen concentrations for most ocean regions and the expansion of oxygen-depleted zones. A temperature-driven solubility decrease is responsible for most near-surface oxygen loss, though oxygen decrease is not limited to the upper ocean and is present throughout the water column in many areas.

Total sea ice extent has been declining rapidly in the Arctic, but trends are insignificant in the Antarctic. In the Arctic, the summer trends are most striking in the Pacific Sector of the Arctic Ocean, while, in the Antarctic, the summer trends show increases in the Weddell Sea and decreases in the West Antarctic sector of the Southern Ocean. The spatial distribution of the changes in sea ice are attributed to changes in wind and ocean currents.

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

Chapter 6A: Plankton (Phytoplankton, Zooplankton, Bacteria and Viruses)

Unicellular microbes dominate marine life in terms of their abundance and diversity and

food webs fuelled by photosynthetic picoplankton, while fisheries and the biological pump are supported primarily by metazoan food webs fuelled for the most part by diatoms and microbial food webs.

supply and N2-fixation and for > 90 per cent of dimethyl sulphide (DMS) emissions to the atmosphere. Diatoms and photosynthetic picoplankton account for most primary production.

Climate-driven upper ocean warming and associated increases in vertical stratification and decreases in inorganic nutrient supplies to the euphotic zone are likely to result in decreases in

Of those fish species with conservation assessments, around 6 per cent of bony fishes are threatened or near threatened with extinction, rising to almost 50 per cent of elasmobranchs, both species of Coelacanth and 10 per cent of chimeras.

Capacity for documenting and understanding marine fish diversity continues to grow, but significant gaps remain for some important components (e.g. mesopelagic fishes) and in predicting responses to multiple simultaneous stressors.

Chapter 6D : Marine Mammals

Marine mammals continue to provide significant economic and cultural contributions to coastal communities. Globally, they play ecosystem engineering roles that benefit all marine ecosystems.

In terms of macroalgal endemism, Antarctica ranks highest, with 33 per cent endemics, followed by South America (22 per cent) and the Red Sea Large Marine Ecosystem (LME) (9 per cent).

New techniques such as genomics have been developed for species identification and for elucidating phylogenetic relETr cent

Projections of future states suggest continued decreases in coral abundance, reef-associated fishes and the architectural complexity of reef frameworks.

Chapter 7F: Cold Water Corals

immersion by tides.

and benthic species into the newly open water environments.

`In general, however, many ice-dependent species are decreasing in abundance and spatial distributions, particularly in the Arctic.

Decreasing sea-ice extent in the Arctic provides increased opportunities for a range of human activities, including fishing, navigation and hydrocarbon exploration, with positive implications for several Nations Sustainable Development Goals (SDGs).[1]

Many of these activities, however, will remain marginal for some time as a seasonally ice-free Arctic is not expected until later this century.

Decreasing sea ice will, however, reduce local community access to subsistence hunting opportunities.

Chapter 7N: Seamounts and Pinnacles

Seamounts and pinnacles are common topographic features of the global ocean.

Sampling effort has increased in recent years but, overall, only a small percentage of seamounts has been sampled in detail.

Limited sampling, combined with
high environmental variability among seamounts, constrains biodiversity knowledge.

Fishing, and bottom trawling in particular, constitutes the single greatest threat to seamount ecosystems but marine debris/litter, climate change and potential seabed mining are additional concerns. However, initiatives to protect seamounts are increasing.

Recent time-series research on deep seamounts shows limited, if any, recovery of stony coral communities even 15 20 years post closure.

Chapter 7O: Abyssal Plains

The abyss lies between 3 and 6 km water depth and covers more than
lies between 3 and 6 0.000008871 0 595.3F3 10.95 Tf 1 W* n BT /F5 10.95 Tf 1 0 0 1 70

Chapter 7Q

Pharmaceuticals and personal care products

Hundreds of pharmaceuticals and personal care products (PPCPs) have been detected in the ocean, including in the Arctic and Antarctic.

Novel analytical techniques have been developed for non-target analysis of PPCPs and their transformation products in the marine environment.

Chapter 14: **Changes in Coastal and Marine Infrastructure**

Coastal and marine infrastructures realize human activities and materialize use functions of the system of coastal and marine natural resources.

Infrastructures can influence natural systems and their use, and create pressures and conflicts or favourable conditions.

In the next decade, frontier regions such as the

NIS can pose significant biosecurity and biodiversity hazards. Large-scale NIS sur4ohS

of information on the intensity and footprint of activities that may be affecting marine ecosystems; (ii) identification of the responses of ecosystem components; of management measures that could be applied in response.

Despite their increase in use, assessments focused on particular regions, areas or values that follow the same general steps outlined above are largely lacking from areas outside Europe and North America.

This geographical bias in implementation of CEAs highlights clear knowledge and capacity gaps, and the need for the development of approaches that: (i) can be implemented in regions where data is lacking; (ii) are easily implementable; and (iii) produce outputs that can be readily understood and translatable to decision-making processes, particularly in developing countries.

PART 6: TRENDS IN MANAGEMENT APPROACHES TO THE MARINE ENVIRONMENT

Chapter 29: Developments in Marine Spatial Planning

The growing scale of human activities and the associated impacts on the marine environment mean that conflicts are increasingly occurring between different uses of the ocean. Marine spatial planning is an effective way of resolving such conflicts.

Over the past two decades, marine spatial planning has been instituted to a growing extent in many jurisdictions, in a variety of forms: some are simply zoning plans; others include more complex management systems.

The legal status of marine spatial planning varies between jurisdictions: in some it is guidance to be taken into account; in others it has legal force constraining specific management decisions.

In general, marine spatial planning has been most effective where it has been developed with the involvement of all relevant authorities and stakeholders.

Chapter 30: Developments in Management Approaches

The ecosystem approach is one of the most significant approaches to ocean management, consisting of the environmental, social and economic management of human interactions with oceans and coasts at multiple scales (i.e. transboundary, regional, national and local).

While there is general agreement that the ecosystem approach provides an effective framing of ocean management, further research and capacity-building is needed to realize its full potential benefits across the oceans.

Management has two different levels of governance, namely, decision-making processes that provide a framework to make decisions and implement policy focused on the conservation and sustainable use of marine resources; and management tools (area-based and non-area based) that can be used to regulate and modify human activity in a particular system.

The implementation of the 2030 Agenda for Sustainable Development[1] requires management grounded in the ecosystem approach in order to achieve the integrated set of global priorities and objectives set out in its Sustainable Development Goals (SDGs). This will allow for the integration of the interactions, benefits and trade-offs between the SDGs and support achievement of each of the ocean-related targets.

There is a growing trend towards incorporating the cultural values of the ocean into management.

Chapter 31: Developments in the Understanding of Overall benefits from the Ocean to Humans

Ocean resources provide main sources of livelihoods to millions of people across the globe. They also provide a wide range of ecosystem services or benefits including oxygen production, carbon storage, genetic resources and general life support services. However, these ecosystem services from marine and coastal ecosystems are deteriorating at an alarming rate.

Human activities are directly or indirectly affecting ecosystem services and thus can reduce or erase benefits that otherwise would be provided. As human activities in the marine environment are expected to increase in the future, in particular in areas beyond national jurisdiction, they will not only exert growing pressure on natural resources, but may also threaten marine biodiversity and thus the benefits people obtain from ecosystem services.

International law as reflected in the United Nations Convention on the Law of the Sea[1] plays a crucial role in the conservation and the sustainable use of the ocean and its resources and in safeguarding the many ecosystem services that the ocean provides both for current and future generations. Actions and efforts should primarily focus on implementation and regulatory gaps, especially in areas beyond national jurisdiction.

This gives added significance to the current negotiations at the United Nations on the elaboration 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 biodiversity of areas beyond national jurisdiction.

The distribution around the world of the benefits drawn from the ocean is still very uneven. Gaps in capacity-building and resource and financial constraints hamper less developed countries in taking advantage of what the ocean can offer them.

Capacity-building and shared scientific knowledge and the transfer of marine technology will empower States to fully participate in and benefit from the conservation and sustainable use of the ocean and its resources and assist them in meeting their obligations.