Preface to Transitioning to Sustainable Life below Water

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1. Introduction

The ocean has played a major role for humanity for thousands of years. It connects and separates people and nations, and provides space for trade and transport, raw materials and food. Just as old is the attempt to regulate the use of the ocean and to use it for one's own interests. It took until 1967, however, for Arvid Pardo, a diplomat from Malta, who represented his small island state, which had recently become independent, at the UN as an ambassador, to give a much-noticed, four-hour speech in which he denounced the unchecked exploitation of the seas and the seabed and the unequal distribution of opportunities, especially for small states, to share in the fruits of the sea. His call for the oceans as a whole to be declared the heritage of all humanity and for mechanisms to be developed to give all states equal opportunities to use the oceans ultimately led to the 3rd Conference on the Law of the Sea and the formulation of the United Nations Convention on the Law of the Seas (UNCLOS) in 1982. Unfortunately, UNCLOS is mainly concerned with the territorial seas as national economic zones (EEZs) and the seabed. The open ocean beyond the EEZ is not covered.

The 3rd Conference on the Law of the Sea, which consisted of 10 sessions from 1973 to 1982, also led to discussions in other UN agencies on better ocean management. However, the approaches were sectoral. Juda and Burroughs (1990) and Alexander (1993) urged a trans-sectoral approach to sustainable management.

This step was only achieved with the signing of the Convention on the implementation of the Sustainable Development Goals (SDGs) in 2015, in which the member states of the United Nations issued a universal call to action to effectively fight poverty, protect our planet and ensure that all people can live in peace and prosperity by 2030.

Finally, the largest habitat we have on this planet, the ocean, is also given recognition of the importance it has for humanity with the dedication of its own goal, SDG 14 *Life below Water*.

The oceans drive global energy and material flow systems. They are thus largely responsible for the distribution of nutrients and heat on the planet, absorbing heat from the atmosphere and storing it, thus acting as a buffer for natural fluctuations.

The oceans absorb about 30% of the carbon dioxide produced by humans. The absorption of carbon dioxide manifests as a reduction in pH, commonly referred to as ocean acidification, and affects the oxygen content of the water. This has led to an increase in oxygen depletion in many coastal waters and major upwelling areas worldwide (Zhang et al. 2010). Human-sponsored marine pollution is reaching alarming levels, with nutrient inputs, toxic chemicals, plastics and munition debris having long-lasting negative impacts on ecosystems (see the following chapters).

In this context, SDG 14 is embedded in the complex network of 17 goals in total, all of which are interrelated, interdependent and call for a move towards social, economic and environmental sustainability. The sustainable management of our marine ecosystems, coasts and marine resources will remain our greatest challenge in the 21st century.

Relatively recent shifts in policy discourse have thus turned towards developing approaches of integrated marine and coastal governance. The empirical and theoretical knowledge base, however, is substantially less developed than that with regard to terrestrial systems. Thus, sciences within the field of ocean governance are, first, increasingly concerned with building sound empirical and theoretical bases for understanding the complexities of governing coastal and marine spaces; and second, with fostering science–policy dialogues that assure close interactions and mutual transformative learning for building ocean governance frameworks and instruments on international, regional and national levels that meet the challenges of increased uses and limited carrying capacities of the ecosystems themselves. The aim of these debates is to develop governance instruments that are applicable across sectors and ecosystems and at local, national and regional levels (Schlüter et al. 2020; Kirkfeldt et al. 2021; Gissi et al. 2021).

This volume brings together a number of papers giving insight into the knowledge bases with regard to marine ecosystems and their governance challenges, as well as reflecting the policy environment and governance instruments needed for meeting the Agenda 2030 formulated by the UN in 2015 based on these insights (OceanGov 2020).

2. Climate Regulator, Biodiversity Hub and Resource Provider

The ocean drives global energy and material fluxes and acts as global climate regulator, hosts enormous biodiversity and is a key source of protein supply for humans (FAO 2020; IPCC 2019; IPBES 2019). It captures large quantities of carbon and produces around 50% of atmospheric oxygen. The absorption of carbon dioxide results in a reduction in the pH value, commonly referred to as ocean acidification,

which affects the oxygen content of the water. The latter has led to an increase in oxygen depletion in many coastal waters and large upwelling areas worldwide, changing organisms' life cycles and whole ecosystems. Marine pollution, which is mainly caused by humans, has reached alarming levels, with nutrient inputs, toxic chemicals, plastics and ammunition residues having long-lasting negative effects on ecosystems. About half of humanity is directly or indirectly dependent on marine and coastal ecosystems for its quality of life. The total value of marine ecosystem services was estimated to reach USD 21 trillion, USD 11 million thereof from coastal systems (Costanza et al. 1997). The market value of marine and coastal resources and industries is estimated at USD 3 trillion per year, or about 5% of the global GDP (UNCTAD 2021). According to the UN Food and Agriculture Organization (FAO), fisheries and marine aquaculture form the basis of livelihood provision for some 12% of the world's population. In many developing countries, fish and seafood are an essential source of protein. We cannot stand by as our coasts and seas continue to be polluted and resources over-exploited, and human-driven climate change is changing entire ecosystems. Not only should we, but we must use the marine ecosystem in a way that keeps it healthy and provides us with optimum of services. Sustainability means using the sea intelligently for the benefit of all humanity. This is the basic statement behind SDG 14 *Life below water*.

The international community has, thus far, not sufficiently addressed these challenges. The strategic and economic relevance of the ocean and its resources decisively influences the negotiation processes and leads to protracted negotiations. This applies to the awarding of deep-sea mining rights via the International Seabed Authority, as well as agreements on the handling of biological resources and information from high seas areas (Biodiversity Beyond National Jurisdiction (BBNJ).

3. Ocean Governance for a Sustainable Future

As pointed out above, it is only since the late 1960s that, initiated by Arvid Pardo and supported by Elisabeth Mann Borgese in the 1970s, the idea of the ocean as the common heritage of mankind, was adopted by UN diplomacy and triggered the development of the UN Convention on the Law of the Sea (UNCLOS). However, the principle applies exclusively to the ocean floor and its mineral resources in areas beyond national jurisdiction. Coastal waters (EEZ; within 200 nm) with their living and non-living resources are under national jurisdiction; however, the high sea, with its valuable fish and biological resources, is not regulated, which leads to extensive illegal, unregulated and unreported (IUU) fishing.

In order to achieve significant progress in combating IUU, distributing resources equitably and ensuring equal rights for all, for example, international and transregional cooperation must be promoted, which allow negotiations at eye level geared towards a global common good. Geopolitical tensions are sometimes based on different value systems, for example, with regard to human rights, political regimes, or the value of ecosystems, biodiversity and a healthy ocean. It must be understood that global challenges such as those caused by climate change or the COVID-19 pandemic can only be solved jointly and in transregional dialogue.

Thus, we need structural policies that foster the global common good. The ocean here can play a key role in developing new governance models to maintain its role in stabilizing the climate, acting as home to some of the world's richest biodiversity hotspots, and being available for the upcoming blue economy. Social protection, food and health systems play important roles in contemporary crisis management and in assuring societal resilience with regard to future crises. Quality education (SDG 4) and science and innovation (SDG 9) are the core fields of action to reduce social inequalities (SDG 10), overcome poverty (SDG 1) and ensure social justice and peace (SDG 16), promote political participation, respect cultural diversity, and create a climate-neutral (SDG 13) and stable economic system, which restrict our production and consumption system in ways that CO_2 emissions are reduced, our climate stabilized and a socially just transition is assured.

The Agenda 2030 of the United Nations explicitly focuses on sustainable ocean governance (United Nations 2015). SDG 14 'Life below Water', comprising 10 targets (see annex), is dedicated to the largest habitat on the planet: a habitat that encompasses all climate zones, from the poles to the tropics and is globally connected by large, transregional currents that transport heat and nutrients. SDG 14 focusses on the protection of marine and coastal ecosystems from pollution in a sustainable way and addressing the effects of ocean acidification, the establishment of Marine Protected Areas and fighting against IUU. The formation of scientific knowledge and transfer of marine technology is thematized in the same way as the support of artisanal fisheries is requested. These targets also continue to serve as priority directions during the UN Ocean Decade 2021–2030. The SDGs have stimulated and are the basis for further discussions in other dialogues, such as the Conference of the Parties to the United Nations Framework Convention on Climate Change (UNFCCC); they have also influenced debates on the primacy of Blue Carbon and the sustainable use of marine biodiversity in the Areas Beyond National Jurisdiction (ABNJ), as well as the development of international exploitation rules for deep-sea minerals and the ambitions of some nations to extend their territories towards the open ocean.

4. Overview of the Book

In the following chapters, a number of selected and crucial threats to the ocean's ecosystems are discussed, which relate to the ten targets of SDG 14 'Life below Water' (see Appendix A): ocean warming and acidification caused by the still increasing release of CO_2; pollution as a major human threat to the ocean by releasing chemicals, nutrients and plastics into the sea and the dumping of munitions; responsible management of small-scale fisheries; and deep-sea mining. In addressing these challenges, political will and action are key. Thus, the following chapters each reflect the respective ecosystem challenge from a governance perspective.

As part of the ongoing efforts of Agenda 2030 implementation as well as in preparation of the upcoming Sustainable Development Goal Summit in September 2023 of the United Nations, the volume recommends development policy-makers and researchers—and in line with Hornidge (2020)—to turn their attention to the governance of the world's ocean in the following areas:

Food system of the future: Artisanal fisheries represent the largest group of people working in capture fisheries. It is thus an important economic sector, especially on tropical coasts. Increasingly, this sector is coming under pressure as competition in coastal waters has steadily been increasing for years due to the sale of licenses to foreign industrial fishermen. Too many vessels, oversized nets, as well as too many fishermen in artisanal fishing, who are operating ever-larger motorized boats, are leading to overfishing of the stocks. The social impacts are enormous and mostly neglected by policy makers. There is a lack of alternative income opportunities for the fishermen. The only remedy is the stricter application of existing principles for sustainable fishery management, in combination with the principles of good governance and the rule of law, as formulated in the FAO Guidelines for Small-scale Fisheries (FAO 2015).

Living with coastal change processes: Coastal societies have to adapt to the multiple consequences of changes in socio-ecological systems that are taking place worldwide at an increasing pace. The intensive use of the coasts generates an increasing diversity of stakeholders (e.g., fish farmers, fishermen, tourism companies, infrastructure operators, poor and rich, regulators and regulated) and leads to conflicts of interest and power asymmetries. Here, transformative approaches need to be found that lead to sustainable cooperation between these groups, including scientists. Tools such as marine spatial planning, ecosystem-based fishery management, which includes marine protected areas and adaptations to sea-level rise and coastal erosion, require societal, technological and nature-based solutions, e.g., carbon-capturing mangrove forests.

Knowledge and knowledge partnerships for sustainable ocean governance: An essential task for further improving ocean governance is to better disseminate existing knowledge about the ocean and make it accessible. This will strengthen the negotiating position of coastal states in regional and multilateral debates on ecosystem conservation and blue economy job creation. The SDGs, including the Summit 2023 and the United Nations Decade of Ocean Science for Sustainable Development (2021–2030), are important tools to build and expand necessary regional networks between decision-makers and scientists in the field of ocean governance. The formulation and implementation of sustainability standards (ecological, social, economic and cultural) on a local and regional level and the consistent further development of the "Blue Economy" principles must be one of the goals for the next decade.

The ocean, as the largest contiguous habitat, a source of food, a service provider for the exchange of goods and a buffer for climate fluctuations has finally become prominent in the global political agenda. We must seize the opportunity to set the right path for a sustainable, shared future of our planet.

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Appendix A. Sustainable Development Goal 14—United Nations 2015

Target 14.1: By 2025, prevent and significantly reduce marine pollution of all kinds, in particular from land-based activities, including marine debris and nutrient pollution.

Indicator: Index of (a) coastal eutrophication and (b) floating plastic debris density.

Target 14.2: By 2020, sustainably manage and protect marine and coastal ecosystems to avoid significant adverse impacts, including by strengthening their resilience, and take action for their restoration in order to achieve healthy and productive oceans.

Indicator: Number of countries using ecosystem-based approaches to managing marine area.

Target 14.3: Minimize and address the impacts of ocean acidification, including through enhanced scientific cooperation at all levels.

Indicator: Average marine acidity (pH) measured at agreed suite of representative sampling stations.

Target 14.4: By 2020, effectively regulate harvesting and end overfishing, illegal, unreported and unregulated fishing and destructive fishing practices and implement science-based management plans, in order to restore fish stocks in the shortest time feasible, at least to levels that can produce maximum sustainable yield as determined by their biological characteristics.

Indicator: Proportion of fish stocks within biologically sustainable levels.

Target 14.5: By 2020, conserve at least 10% of coastal and marine areas, consistent with national and international law and based on the best available scientific information.

Indicator: Coverage of protected areas in relation to marine areas.

Target 14.6: By 2020, prohibit certain forms of fishery subsidies which contribute to overcapacity and overfishing, eliminate subsidies that contribute to illegal, unreported and unregulated fishing and refrain from introducing new such subsidies, recognizing that appropriate and effective special and differential treatment for developing and least developed countries should be an integral part of the World Trade Organization fisheries subsidies negotiation.

Indicator: Degree of implementation of international instruments aiming to combat illegal, unreported and unregulated fishing.

Target 14.7: By 2030, increase the economic benefits to developing small-island states and the least economically developed countries from the sustainable use of marine resources, including through the sustainable management of fisheries, aquaculture and tourism.

Indicator: Sustainable fisheries as a proportion of GDP in developing small-island states, the least economically developed countries, and all countries worldwide.

Target 14.a: Increase scientific knowledge, develop research capacity and transfer marine technology, taking into account the Intergovernmental Oceanographic Commission Criteria and Guidelines on the Transfer of Marine Technology, in order to improve ocean health and to enhance the contribution of marine biodiversity to international development, in particular in developing small-island states and the least economically developed countries.

Indicator: Proportion of total research budget allocated to research in the field of marine technology.

Target 14.b: Provide access for small-scale artisanal fishers to marine resources and markets.

Indicator: Degree of application of a legal/regulatory/policy/institutional framework which recognizes and protects access rights for small-scale fisheries.

Target 14.c: Enhance the conservation and sustainable use of oceans and their resources by implementing international law as reflected in UNCLOS, which provides the legal framework for the conservation and sustainable use of oceans and their resources, as recalled in paragraph 158 of "The Future We Want".

Indicator: Number of countries making progress in ratifying, accepting and implementing ocean-related instruments through legal, policy and institutional frameworks, which implement international law, as reflected in the United Nation Convention on the Law of the Sea, for the conservation and sustainable use of the oceans and their resources.

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