

## 15 Transformative Governance for Ocean Biodiversity

Bolanle Erinosh, <sup>1</sup> Hashali Hamukuaya, <sup>2</sup> Claire Lajaunie, <sup>3</sup> Alana Malinde S.N. Lancaster, <sup>4</sup> Mitchell Lennan, <sup>5</sup> Pierre Mazzega, <sup>6</sup> Elisa Morgera <sup>7</sup> and Bernadette Snow <sup>8</sup>

<sup>1</sup> University of Cape Coast, Ghana

<sup>2</sup> Nelson Mandela University, South Africa.

<sup>3</sup> LISST UMR 5193 - Interdisciplinary Laboratory Solidarities, Societies, Territories - University of Toulouse Jean Jaurès, Toulouse, France

<sup>4</sup> University of West Indies, Barbados

<sup>5</sup> Affiliate Researcher at the Strathclyde Centre for Environmental Law & Governance (SCELG), Law School, University of Strathclyde, Glasgow, Scotland

<sup>6</sup> INSERM, Population Environment Development Laboratory, Aix-Marseille University, IRD, Marseille, France

<sup>7</sup> Strathclyde Centre for Environmental Law & Governance (SCELG), Law School, University of Strathclyde, Glasgow, Scotland

<sup>8</sup> Law School, University of Strathclyde, Glasgow, Scotland

All the authors are part of the One Ocean Hub, a collaborative research for sustainable development project funded by UK Research and Innovation (UKRI) through the Global Challenges Research Fund (GCRF) (Grant Ref: NE/S008950/1). GCRF is a key component in delivering the UK AID strategy and puts UK-led research at the heart of efforts to tackle the United Nations Sustainable Development Goals. In addition, Mr Hamukuaya was financially supported by the National Research Foundation (NRF) towards this research: opinions expressed and conclusions arrived at, are those of the author and are not necessarily to be attributed to the NRF.

---

### Abstract (150 words)

This Chapter analyzes the major underlying causes of marine biodiversity loss and focuses specifically on the lessons learnt for transformative ocean governance in the context of area-based management and spatial planning. It illustrates the broad recognition of the vital need for *integrative, anticipatory, adaptive* and *inclusive* governance of ocean biodiversity. Fundamentally, however, the Chapter underscores the need for *transdisciplinary* governance in supporting integration, inclusion and learning in ocean affairs for transformative change. An alternative governance approach is proposed: building on the inter-dependencies between human rights and marine biodiversity, a broader approach to fair and equitable benefit-sharing can support institutionalized shifts towards more transdisciplinary, integrative, inclusive and adaptive governance for the ocean at different scales.

**Keywords (5–10):** ocean governance, marine biodiversity, equity, benefit-sharing, marine protected areas, marine spatial planning, area-based management

### Acronyms

area-based management tools (ABMTs)

Benguela Current Convention (BCC)

carbon dioxide (CO<sub>2</sub>)

Convention on Biological Diversity (CBD)

Convention on the Conservation of Migratory Species of Wild Animals (CMS)

Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)

ecologically or biologically significant marine areas (EBSAs)

illegal, unreported and unregulated (IUU)

large marine ecosystem (LMEs)

marine protected areas (MPA)

marine spatial planning (MSP)

Marine Spatial Management and Governance Project (MARISMA)

Regional fisheries management organizations (RFMOs)

Sustainable Development Goal (SDG)

Sustainable Ocean Initiative (SOI)

United Nations Convention of the Law of the Sea (UNCLOS)

UN Fish Stocks Agreement (UNFSA)

## **1 Introduction**

The ocean's enormity and depth are illustrated by the limited ability of humankind to comprehend it. The current science and policy seascape remains largely fragmented, and as a result the integrity of marine life and the wellbeing of those (human and non-human) dependent on a healthy ocean are being negatively impacted. Fragmented governance is an indirect driver of ocean biodiversity loss, due to its inability to provide synergistic solutions to address simultaneously multiple direct drivers for such loss (over-fishing, land-based and marine pollution, and climate change). This governance problem is well-known (Kelly, 2019; Watson-Wright and Valdés, 2018), and to some extent it is being addressed in international negotiations on a new international instrument on marine biodiversity of areas beyond national jurisdiction (A/RES/72/249, 2017).

This Chapter will shed new light on these well-known problems by applying the lens of “transformative governance” understood as “formal and informal (public and private) rules, rule-making systems and actor-networks at all levels of human society (from local to global) that enable transformative change... towards biodiversity conservation and sustainable development more

broadly”, with a view to “respond[ing] to, manag[ing], and trigger[ing] regime shifts in coupled socio-ecological systems at multiple scales.”<sup>1</sup> We share the editors’ views that there is a need to shift away “from the technocratic and regulatory fix of environmental problems to more fundamental and transformative changes in social-political processes and economic relations.”<sup>2</sup> This can also help to better understand how ocean biodiversity can contribute to “other environmental and social justice issues”<sup>3</sup> that are interwoven with the ocean in less visible ways than terrestrial biodiversity, such as poverty (Singh *et al.*, 2018) and resource grabbing (Viridin *et al.*, 2021).<sup>4</sup>

In particular, the Chapter will illustrate the broad recognition of the vital need for *integrative* and *inclusive* governance of ocean biodiversity, to ensure that solutions also have sustainable impacts at other scales and in other sectors, and to empower those whose interests are currently not being met and represent transformative sustainability values.<sup>5</sup> The complementary roles of adaptive governance (enabling learning, experimentation, reflexivity, monitoring and feedback) and anticipatory (precautionary) governance will also be touched upon. The latter has been extensively debated in international legal scholarship (Guston, 2014; Birnie *et al.*, 2009), so we will reflect on how the former can contribute to the latter. Fundamentally, however, the Chapter will focus on the role of *transdisciplinary* governance (the recognition of different knowledge systems, and the inclusion of underrepresented types of knowledge) in supporting integration, inclusion and learning in ocean affairs for transformative change.

Accordingly, this Chapter will first engage in a brief analysis of the major underlying causes of marine biodiversity loss, by drawing on global synthesis reports. Second, considering the extensive literature assessing existing regulatory mechanisms and their effects on the status and uses of marine biodiversity, this Chapter proposes to focus specifically on the lessons learnt for transformative ocean governance in the context of area-based management and spatial planning from the international to the local level. Finally, an alternative governance approach will be

---

<sup>1</sup> Chapter 1 in this volume.

<sup>2</sup> Ibid.

<sup>3</sup> Ibid.

<sup>4</sup> The term “ocean grabbing” is increasingly utilized to refer to situation “[w]here the benefits from use of finite ocean space and resources characterized as public goods are captured by a few, while traditional ocean users (who are often politically marginalized) lose access to resources and a just operating space within the ocean economy. For example, loss of access for small-scale fisheries, which are by far the ocean’s largest employers, has threatened human rights and exacerbated inequity” (Viridin *et al.*, 2021).

<sup>5</sup> Chapter 1 in this volume.

proposed as a possible way forward: building on the factual and legal inter-dependencies between human rights and marine biodiversity. The chapter will suggest taking a broader approach to fair and equitable benefit-sharing to shift towards transformative governance for the ocean at different scales.

## **2 Marine Biodiversity Loss: Causes and Consequences**

The ocean is an integrated physical and biological system which provides a multitude of planetary services. These include the provision of half of the oxygen we breathe, absorption of 26% of anthropogenic CO<sub>2</sub> emissions from the atmosphere, and rich and diverse life (A/70/112, 2015). The full extent of the ocean's biodiversity is not fully known or understood, but there is sufficient knowledge indicating that marine life is declining dramatically, albeit not yet irreversibly (Serraoneumann *et al.*, 2016). Additionally, we have limited understanding of the intrinsic, as well as the social and cultural, values of marine biodiversity, and its multiple contributions to human identity and wellbeing (Pörtner *et al.*, 2019).

The causes of marine biodiversity loss are numerous, pervasive, and interconnected. Globally, the major direct drivers include overexploitation, climate change, and pollution. The increasing number of zoonotic pathogens associated with biodiversity loss is also affecting marine life, as well as humans (Morand and Lajaunie, 2017). Examples include outbreaks of influenza in seabird populations, and distemper morbillivirus in seal colonies (Morand and Lajaunie, 2017; Bogomolni, *et al.*, 2008; Waltzek, *et al.*, 2012). This led to calls for a more comprehensive global approach in 2020 as the COVID-19 pandemic raged (Ostfeld, 2009; Corlett, 2020), and serves as a reminder of the links between human wellbeing and healthy, resilient ecosystems. The following sub-sections will explore threats to marine biodiversity on the basis of seminal global scientific assessments (A/70/112, 2015; FAO, 2020; IPCC, 2019; IBPES, 2019).

### **2.1 Exploitation of Living and Non-Living Marine Resources**

The exploitation of marine resources has brought about the largest relative impact on biodiversity since 1970 (IPBES, 2019). Illustrative examples may be drawn from fisheries and aquaculture, as well as the projected impacts of commercial mining activities in the deep seabed, both of which can contribute to habitat and biodiversity loss in the ocean.

Fishing has had the most impact on marine biodiversity in the past 50 years, including impacts across scales on target and non-target species, habitats and ecosystems (IPBES, 2019). Combined with the effects of climate change, fishing is expected to remain a leading driver in the worsening the state of marine biodiversity (IPBES, 2019). Funded by harmful government subsidies, commercial fishing fleets have expanded geographically and into deeper waters which were previously not financially viable to exploit (Sumaila *et al.*, 2019; IPBES, 2019), directly contributing to global decline in fish stocks (FAO, 2020). Fishing above sustainable levels causes negative impacts on marine biodiversity and reduces fish productivity and ecosystem functioning (FAO, 2020). Bycatch caused by non-selective fishing methods impacts marine biodiversity, and some fishing gear, such as bottom trawls and pelagic drift nets, also cause damage to habitats and biodiversity. The United Nations has recognized the threat of illegal, unreported and unregulated fishing (IUU) fishing goes beyond the depletion of fish populations and there is a close nexus between the illegal activities in fisheries and transnational organized criminal activity, known as fisheries crime (A/63/111, 2008).<sup>6</sup> Fisheries crime threatens fish stocks and undermines the international goal to conserve and use the ocean for sustainable development (A/RES/70/1, 2015; A/RES/60/31/2006). Finally, the impacts of fisheries crime are being exacerbated by climate change (IPBES, 2019; NIC, 2016; Cheung, 2016).

Aquaculture, whether it is coastal farming or offshore aquaculture (Holmer, 2010), has been promoted as a means to address both overfishing and food security, but may have a negative impact on the environment and biodiversity, mainly arising from excess feed, pesticides, and medicines leaching into the marine environment (Tovar *et al.*, 2000). Aquaculture may affect ecosystems and biodiversity with the loss of critical habitats like mangrove or wetlands, with consequences for coastal protection (Páez-Osuna, 2001), or the alteration of hydrologic regimes by the use of structures such as fish cages (Eng *et al.*, 1989). The intensification of aquaculture has a dramatic effect on seabed fauna and their abundance (Tsutsumi *et al.*, 1991; Diana, 2009). In

---

<sup>6</sup> There is no universally accepted definition of fisheries crime, and different organisations describe this concept differently. The United Nations Office on Drugs and Crime (UNODC), for example, describes fisheries crime as “[a]n ill-defined legal concept referring to a range of illegal activities in the fisheries sector. These activities - frequently transnational and organised in nature - include illegal fishing, document fraud, UNODC trafficking, and money laundering. Criminal activities in the fisheries sector are often regarded as synonymous with illegal fishing, which many States do not view or prosecute as criminal offences, but rather as a fisheries management concern”. Refer to the UNODC *Fisheries Crime*, at [https://www.unodc.org/documents/about-unodc/Campaigns/Fisheries/focus\\_sheet\\_PRINT.pdf](https://www.unodc.org/documents/about-unodc/Campaigns/Fisheries/focus_sheet_PRINT.pdf).

turn, coastal pollution (agriculture, hydrocarbon, heavy metals) and marine pollution affect the success of aquaculture (Eng *et al.*, 1989).

## 2.2 Pollution

Pollution is the direct or indirect introduction by humans of substances which result or are likely to result in deleterious effects to the environment (UNCLOS, Art. 1(4)). Marine and coastal areas are highly vulnerable to pollution from activities on land or at sea, which have a direct impact on marine biodiversity. Land-based pollution comes in many forms, including nutrient run-off (untreated sewage), agricultural and industry run-off such as pesticides, heavy metals, or oils entering river systems and then the open ocean (UNEP/EA.4/Res.11, 2019). Marine pollution can come from a variety of activities at sea, including plastics from discarded fishing gear, dumping from vessels, and underwater noise (UNEP/EA.3/L.19, 2018).<sup>7</sup> Marine environmental pollution has gathered international attention, as captured in Sustainable Development Goal (SDG) 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.”

Plastic pollution is pervasive in the marine environment, and the widespread impacts of macro- and micro-plastics on marine biodiversity at all levels are sobering. Addressing plastic pollution presents a complex governance challenge and is subject to intensified international attention. For example, the UN has highlighted the pervasive nature of plastic pollution, highlighting that between 4.8–12.7 million tons of plastic enters the ocean annually (UNEP/EA.3/L.19, 2017). The vast majority of this (~80%) is from land-based sources,<sup>8</sup> while the rest comes from maritime activities, including fishing (Isensee and Valdes, 2015), which requires stronger monitoring and control by States to prevent plastic entering ocean systems (Haward, 2018) and potentially new measures at the international level (Borrelle, *et al.*, 2017).

Deep-seabed mining for minerals and rare-earth metals at a commercial scale occurs in areas within national jurisdictions and may soon be a reality in the Area (which is the seabed beyond national jurisdiction of any State; one of the two areas outside national jurisdiction,

---

<sup>7</sup> See also, for example, [www.unesco.org/new/en/natural-sciences/ioc-oceans/focus-areas/rio-20-ocean/blueprint-for-the-future-we-want/marine-pollution/facts-and-figures-on-marine-pollution/](http://www.unesco.org/new/en/natural-sciences/ioc-oceans/focus-areas/rio-20-ocean/blueprint-for-the-future-we-want/marine-pollution/facts-and-figures-on-marine-pollution/).

<sup>8</sup> Isensee and Valdes (2015) estimated that around 4.8–12.7 million tonnes of plastic is dumped in the ocean from land-based sources.

together with the high seas) (Casson *et al.*, 2020).<sup>9</sup> Noise and light pollution, as well as sediment plumes may have a harmful effect on marine species, the mining itself may permanently destroy deep-sea habitats, and may impact communities relying on fish stocks with potential human rights implications (Miller *et al.*, 2018). Deep-sea sediments act as long-term stores of atmospheric carbon, meaning mining activities may pose an additional climate risk by releasing carbon through sediment disturbance (Sala *et al.*, 2021).<sup>10</sup> Climate change is also predicted to alter deep-ocean environments and to be exacerbated by other deep-sea extractive activities such as oil and gas extraction, and bottom fishing (Levin *et al.*, 2020).

### 2.3 Climate Change

There is scientific consensus that human-induced climate change is altering the physical and chemical makeup of the ocean (Stocker *et al.*, 2013). The main impacts of climate change on the ocean are warming (IPCC, 2019), acidification, and deoxygenation, which simultaneously occur due to increasing carbon dioxide (CO<sub>2</sub>) and other greenhouse gas emissions (Beaugrand *et al.*, 2015; Molinos *et al.*, 2016). These changes are expected to persist throughout this century, as levels of CO<sub>2</sub> increase to those unseen in human times (Gattuso *et al.*, 2015). Transformative governance has thus been recommended by the Intergovernmental Panel on Climate Change to address and adapt to these issues (IPCC, 2015).

The consequences of climate change on marine biodiversity include species extinction, local changes in species richness, proliferation of invasive species, ecosystem collapse, and disruption of ecosystem functioning and services (IPCC, 2019; FAO, 2018; Cheung *et al.*, 2009; Beaugrand *et al.*, 2015; Molinos *et al.*, 2016). In addition, climate change is projected to decrease net ocean primary production and fish biomass (IPBES, 2019). Changes in the distribution of fish populations from historical locations can affect livelihoods, income and food security (SROCC, 2019), and increase conflicts between fishers, communities, authorities, and between States; highlighting a need for *adaptive* governance in the conservation and management of marine species (SROCC, 2019; Spijkers *et al.*, 2019).

---

<sup>9</sup> Article 1(1)(1) of UNCLOS defines the “Area” to be “the seabed and ocean floor and subsoil thereof, beyond the limits of national jurisdiction”. Within Namibia’s jurisdiction commercial seabed mining activities for diamonds occur and may soon expand to mining the seabed for phosphate. (Casson *et al.*, 2020).

<sup>10</sup> Seabed disturbance can re-mineralise carbon stored in the seabed into CO<sub>2</sub> and be subsequently dissolved into the ocean or released into the atmosphere, the following study suggests protecting the carbon-rich seabed as a nature-based solution to climate change (Sala *et al.*, 2021).

Roughly half of the CO<sub>2</sub> emitted by anthropogenic activities between 1800 and 1994 is stored in the deep ocean as organic matter from absorption by planktonic organisms (Sabine *et al.*, 2004). Since 1980, this uptake has been between 20–30% of total anthropogenic CO<sub>2</sub> emissions causing an increase in ocean acidification (IPCC, 2019). Acidification of the ocean decreases its ability to uptake and store carbon (IPBES, 2019), and leads to habitat destruction, with coral reef ecosystems particularly under threat (IPCC, 2019), alteration of marine food webs (Kleypas *et al.*, 1999; Freely *et al.*, 2004), and sensory perception changes in marine species (Dixson *et al.*, 2010; Munday *et al.*, 2009; Munday *et al.*, 2010).

As a result of both climate change and pollution, ocean deoxygenation has become a pervasive yet overlooked issue. Deoxygenation is caused by warming of ocean waters, from agricultural run-off into rivers, and the atmosphere from burning of fossil fuels (Laffoley and Baxter, 2019). This causes species loss, resulting in changes in ecosystem structure and function (Laffoley and Baxter, 2019). There has been a marked loss in ocean oxygen levels from the surface to 1000m depth since 1970, leading to the prevalence of oxygen minimum zones, which are uninhabitable for many marine species (IPCC, 2019).

## **2.4 Lessons Learnt**

While our global understanding of the multiple threats to marine biodiversity is growing, ocean science is “still weak in most countries” due to limited holistic approaches for understanding cumulative impacts of various threats, and lack of capacity to conduct science (A/71/733, 2017). Low- and middle-income countries face the greatest challenges in this regard, to prevent and mitigate negative development impacts connected to the ocean, participate in traditional and emerging ocean activities (Blasiak, 2018), and to predict and harness the socioeconomic benefits of ocean conservation (Blasiak, 2018). As a result, scientific understanding of the effectiveness of conservation and management responses is poor, meaning it is more difficult to predict the productivity limits and recovery time of marine ecosystems in these countries. Meanwhile, the negative social, economic and cultural impacts of degraded mangroves and corals on local communities are increasingly noted (CBD, Decision XII/23, 2014), as are the negative impacts of declining fisheries on the human rights to food and culture (A/67/268, 2012). The urgency of advancing ocean science, in and to the benefit of all countries, is expected to take centerstage

globally with the UN declaring 2021-2030 as the Decade of Ocean Science for Sustainable Development (UNESCO, 2020).

This situation is compounded by limited efforts to bridge different knowledge systems (notably indigenous and local knowledge), which contributes to marginalizing these knowledge holders from relevant decision-making, even if these groups are disproportionately affected by their negative consequences. Furthermore, limited understanding of the benefits that derive from a healthy ocean for society and the economy fuels a “disconnect” between some communities and the ocean (Jamieson *et al.*, 2020). In effect, only recently have global scientific reviews highlighted the multiple dependencies of people’s right to health on the marine environment (WHO/CBD, 2016; A/HRC/34/49, 2017; A/75/161, 2020).

From a transdisciplinary governance perspective, all the facts observed, and anticipated scenarios, in the global reports analyzed above are not equally known, and even less equally predictable. For instance, if the recent rate of fishing capture is maintained, the collapse of some fisheries is almost certain, while others, especially close to the shores of the more important fishing nations, have already collapsed, leading these States to travel greater distances, thereby replicating the process elsewhere. It is also projected that the warming and acidification of the ocean will exacerbate this. In contrast, the severity and the intensity of the impacts that will result from deep-sea mining is very difficult to evaluate, as well as the effects of all the occurring changes that are cascading through unpredictable interactions. Here, the limited predictability of changes in the state of the ocean and marine resources is not a matter of observation, monitoring techniques, or models (Mazzega, 2018). Rather, unpredictability is intrinsic to the complex dynamics of the ocean system, emphasizing the need for ocean governance to be anticipatory and adaptive.<sup>11</sup>

Furthermore, while the main trends summarized above represent scientific consensus, these global syntheses of current knowledge are based on a small fraction of the volume of articles annually published on these themes.<sup>12</sup> The limitation of these systematic reviews is of particular concern because the impacts of human activities and environmental changes on biodiversity are for the vast majority manifesting at relatively local scales, in specific ecosystems or biomes. They require careful observations and analysis in context (Allan *et al.*, 2013).

---

<sup>11</sup> Chapter 1 in this volume.

<sup>12</sup> This situation should be compared with the synthesis of knowledge on the climate, see Minx *et al.*, 2017.

### 3. An Assessment of Existing Mechanisms for Ocean Governance

The international legal framework for the ocean is considered “critical” to make progress in all target areas of SDG 14: “life below water” (A/71/733, 2015). The international framework, though, is notoriously so complex and fragmented (sectorally and geographically) to present colossal challenges to effective, let alone transformative, ocean governance. To an extent, fragmentation is the result of historical process of international law-making. The earliest marine treaties focused on clarifying the rights and obligations of States over portions of the ocean,<sup>13</sup> establishing safeguards,<sup>14</sup> regulating discharge of wastes and pollution from shipping,<sup>15</sup> and managing fishing resources. The next wave of treaties prioritized specific objectives, including the protection of (marine) species.<sup>16</sup> However, the narrow scope and diverse approaches encapsulated within these instruments often failed to consider the impacts on ecosystems in a holistic and integrated manner (Kimball, 2001; Mossop, 2007). As these treaties resulted in a patchwork approach to marine management, early attempts at integrated ocean governance began with the negotiations of the 1982 United Nations Convention of the Law of the Sea (UNCLOS).<sup>17</sup>

UNCLOS, commonly referred to as the ‘constitution of the oceans’, firmly embodies elements of customary international law, as well as several innovative features for a more comprehensive approach to the regulation of ocean activities, including on the basis of a general obligation to protect and preserve the marine environment. UNCLOS, however, heavily relies on other international instruments and mechanisms, thereby confirming the continued relevance of sectoral and regional governance approaches.

---

<sup>13</sup> For example, the Byzantine *Lex Rhodia*, the *Rolls of Oléron* and the *Laws of Wisby*

<sup>14</sup> For example, the General Treaty for the Cessation of Plunder and Piracy by Land and Sea, Dated February 5, 1820 and the 1914 the International Convention for the Safety of Life at Sea.

<sup>15</sup> International Convention for the Prevention of Pollution from Ships 1973/38; Convention on the Prevention of Marine pollution by Dumping of Wastes and other Matter 1972; 1996 Protocol (London Protocol).

<sup>16</sup> For example, the International Convention for the Regulation of Whaling (ICRW), Washington D. C., 2 December 1946, in force 10 November 1948; 161 UNTS 17, 338 UNTS 336; Convention on the Conservation of Migratory Species of Wild Animals (CMS), Bonn, 23 June 1979, in force 1 November 1983, 19 ILM (1980) 15; Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), Washington DC, 3 March 1973, in force 1 July 1975, 993 UNTS 243.

<sup>17</sup> United Nations Convention on the Law of The Sea (UNCLOS), Montego Bay, 10 December 1982, in force 16 November 1994, 21 ILM 1261.

Table 15.1. Main biodiversity-related changes, direct drivers (climate change CC, fisheries F, exploitation of non-living resources E), spatial scales (local, regional, global), concerned conventions and organizations analyzed in the chapter. An x indicates that the authors understand the conventions concerned, or the decisions adopted under them, or the instruments deployed by the organizations have sought to address these changes and drivers. A question mark indicates the conventions or their decisions may be applicable to these changes and drivers, but need further study. The table is meant as a basis for discussion with other legal and non-legal experts, as the understanding of governance landscape may be subject to differing interpretations.

Biodiversity Related Changes	Direct Drivers*			Local	Regional	Global	International instruments					Organisations	
	CC	F	E				UNCLOS	FSA	CBD	CMS	CITES	ISA	IMO
Species Extinction	■	■	■	■	■	■	X	X	X	X	X	?	
Decrease Net Primary Production	■			■	■	■		?	X				
Decrease Fish Biomass	■	■		■	■	■		X	X				
Perturbation of Ecosystem Functioning	■	■	■	■	■	■		X	X		X		
Protection of Marine Habitats	■	■	■	■	■	■	X	X	X	X	X	X	X
Perturbation of Life Cycles	■		■	■	■	■		?	X	X			
Proliferation Invasive Species	■			■			X		X	X	?		X
Community Recomposition	■	■		■				X	X				
Loss of Species Richness	■		■	■				X	X	?			

\*CC: climate change ■ ; F: Fisheries ■ ; E: exploitation of non-living resources ■

For instance, the UN Fish Stocks Agreement (UNFSA) implements UNCLOS Articles 63–68, and 116–120 on straddling and highly migratory fish, and sets out obligations to ensure sustainable fishing activities and mitigate the impacts of fishing on the marine environment and biodiversity, applying the precautionary principle when scientific information is inadequate or absent (Art. 6). UNFSA, in turn, is significantly underpinned by regional, collaborative approaches (Arts. 9 & 15). Arguably, therefore, UNFSA both requires, and sets the conditions for, an integrative, anticipatory and inclusive approach at the regional level, which, with the correct synergies, may be scaled up to the global level. Examples of such approaches will be discussed in Section 2.3 below.

While UNCLOS reflects to some extent the evolution of natural sciences and ecosystem management by referring to the interrelatedness of the problems of ocean spaces and the need to consider them as a whole, a parallel legal development under international environmental law has also contributed to a more integrative and inclusive approach to ocean governance. This is the case of the Convention on Biological Diversity (CBD)<sup>18</sup> and its objectives of conservation, sustainable use, and fair and equitable benefit-sharing (Morgera and Razzaque, 2017). Over the years, the CBD has provided integrative tools to complement earlier biodiversity-related treaties, including Convention on International Trade in Endangered Species (CITES) and the Convention on Migratory Species (CMS) (UNEP-WCMC, 2012), and contributed to addressing the nexus between the ocean, climate change and biodiversity (Morgera, 2011; Diz, 2017). It has also addressed an increasing number of new and emerging human activities that pose challenges to biodiversity conservation and sustainable use, such as renewables development, which can increase demands for ocean space (UNCTAD/DITC/TED/2014/5). In doing so, the CBD has also addressed the specific concerns of indigenous peoples and local communities (IPLC), and highlighted the importance of their knowledge (Morgera, 2020), thereby contributing to defining inclusive and transdisciplinary ocean governance.

These developments have occurred under the CBD ecosystem approach (CBD Decisions V/6, 2000; VII/11, 2004), which aims at integrating the management of land, water and living resources, and balancing the three objectives of the Convention, as well as integrating different legal and management strategies, depending on local, national, regional or global conditions (CBD Decision V/6, 2000, Annex, para. 5), through adaptive management and precaution (thereby

---

<sup>18</sup> Convention on Biological Diversity (CBD) 1992, 1760 UNTS 79 (CBD), Art 1.

contributing to adaptive and anticipatory governance) (Morgera, 2011). The ecosystem approach also aims to integrate modern science and indigenous and local knowledge (CBD Decision V/6, 2000, Principle 11), as well as equity concerns, recognizing that human beings, and their cultural diversity are an integral component of many ecosystems (CBD Decision V/6, 2000, para. 2). Under this umbrella, one of the key obligations under the CBD is to establish a system of protected areas (CBD, Art 8(a). This was complemented with a target of 10% increase in marine protected areas (MPA) coverage by 2020 among the Aichi Biodiversity Targets,<sup>19</sup> by implementing effective and equitable protection of marine and coastal areas, particularly those important for biodiversity and ecosystem services (Aichi target 11).<sup>20</sup> Scientific guidance for the development of representative MPA networks had been previously adopted by CBD Parties in 2008 (CBD Decision X/2, 2010, target 11)<sup>21</sup> and ‘ecologically or biologically significant marine areas’ (EBSAs) have been described by States as meeting the scientific requirements to benefit from enhanced conservation and management measures, protected status and impact assessments.<sup>22</sup> That said, commentators (Diz *et al.*, 2018) have underscored that while progress has been made towards the 10% target in quantitative terms, the qualitative elements of the MPA target (effectively and equitably managed, ecologically representative and well connected systems), which would contribute to inclusive and integrative governance, have received far less attention (Rees *et al.*, 2018).

Also linked to the ecosystem approach, the guidance elaborated under the CBD in relation to marine spatial planning places a focus on the need to identify stakeholder roles and interests, promoting a deeper understanding of their dependence on ecosystem services, enhancing collaboration across different cultures, and demonstrating fairness, transparency and inclusiveness, including by employing a long-term historical perspective on how current conditions and issues evolved in a given area (CBD Decision XIII/9, 2016). This approach can address one of the main sources of opposition to the creation of MPAs: rather than pitting conservation against fisheries as

---

<sup>19</sup> See [www.cbd.int/sp/targets/](http://www.cbd.int/sp/targets/)

<sup>20</sup> It is estimated that there are 15,292 MPAs covering 6.4 per cent of the global ocean area or 14.4 per cent of coastal and marine areas under national jurisdiction, as of July 2017 see <https://www.unep-wcmc.org/>; See also SDG 14.2 Update source: <https://mpatlas.org/>

<sup>21</sup> The criteria for describing ‘ecologically or biologically significant marine areas in need of protection and guidance for designing representative networks of MPA required sites to reflect at least one of the listed criteria of uniqueness or rarity; special importance for life history stages of species; importance for threatened, endangered or declining species and/or habitats; vulnerability, fragility, sensitivity or slow recovery; biological productivity; biological diversity; and naturalness.

<sup>22</sup> Areas described as EBSA range from relatively small sites to very extensive oceanographic feature representative of a full range of ecosystem habitats, biotic diversity and ecological processes (Johnson, 2019).

competing interests, it could support the co-development of MPAs as integral components of ecosystem-based fisheries management (Rees *et al.*, 2020). This approach can also support the fair and equitable sharing of benefits arising from the establishment of MPA networks (discussed in Section 3.2 below) with ecosystem stewards and traditional knowledge holders, thereby contributing to integrative, inclusive and transdisciplinary governance (Ntona and Morgera, 2018).

### **3.2 A Common but Differentiated Strategy: The Use of Area Based Management Tools in Achieving Integrative Governance of the Ocean**

UNCLOS,<sup>23</sup> as well as treaties aimed at improving safety at sea,<sup>24</sup> support area-based management tools (ABMTs),<sup>25</sup> such as MPAs (IUCN, 2016; De Santo, 2018; Warner, 2019), and previous experiences led by regional organizations serve to illuminate key opportunities and challenges (De Santo, 2018). ABMTs have in effect been promoted from early on in the regional context, most notably through the Regional Seas Programme, which was birthed from early attempts by UNEP to catalyze a more specialized and integrated methodology at the regional level (Akiwumi and Melvasalo, 1998).<sup>26</sup> Described as one of UNEP's most significant achievements in the past thirty-five years,<sup>27</sup> the concept's linchpin is to engage neighboring countries in comprehensive and specific actions for the sustainable management and use of the marine and coastal environment (A/9625, 1974). An additional advantage of the framework is the opportunity that the Regional Seas Programme provides stakeholders to share experiences and support more integrative ocean governance. For instance, relevant States participating in the regional seas Abidjan Convention in West Africa have cooperated with the Benguela Current Commission<sup>28</sup> for the management of the Benguela Large Marine Ecosystem (Cochrane *et al.*, 2009), and with the OSPAR Convention<sup>29</sup> of

---

<sup>23</sup> E.g. Articles 61(2), (3) and (4).

<sup>24</sup> Such as those under the IMO which give rise to special areas and particularly sensitive sea areas.

<sup>25</sup> Area Based Management Tools (ABMTs) could be defined as "regulations of human activity in a specified area to achieve conservation or sustainable resource management objectives." Examples include marine protected areas, ridge to reef, marine spatial planning, areas of particular environmental interest, pollution control zones, or fisheries closure ([https://www.un.org/depts/los/biodiversity/prepcom\\_files/area\\_based\\_management\\_tools.pdf](https://www.un.org/depts/los/biodiversity/prepcom_files/area_based_management_tools.pdf))

<sup>26</sup> UNEP, *Regional Seas Programme* (online) at <https://www.unep.org/explore-topics/oceans-seas/what-we-do/regional-seas-programme>; Refer also to the Strategic Action Plan document available at [www.benguelacc.org/index.php/en/component/docman/doc\\_download/684-bcc-strategic-action-programme-2015-2019-eng](http://www.benguelacc.org/index.php/en/component/docman/doc_download/684-bcc-strategic-action-programme-2015-2019-eng)

<sup>27</sup> <https://sustainabledevelopment.un.org/partnership/?p=7399>

<sup>28</sup> [https://www.iode.org/index.php?option=com\\_oe&task=viewInstitutionRecord&institutionID=12136](https://www.iode.org/index.php?option=com_oe&task=viewInstitutionRecord&institutionID=12136)

<sup>29</sup> Convention for the protection of the marine environment of the North-East Atlantic, Paris, 22 September 1992, in force 25 March 1998, 2354 UNTS 67.

the North East Atlantic, providing an almost complete coverage of the Eastern Atlantic.<sup>30</sup> This has led to exchanging knowledge and capacity, as well as ensuring coherent implementation of the ecosystem approach, beyond the scope of the respective conventions. That said, there is widespread understanding that UNCLOS provides limited guidance on MPA networks, and progress has been too limited in areas beyond national jurisdiction. For these reasons, ABMTs are currently being addressed in international negotiations on a new international instrument on marine biodiversity of areas beyond national jurisdiction (De Santo, 2018).

Regional fisheries management organizations (RFMOs) have also established ABMTs. The advantage of RFMOs is that they can adopt targeted management measures that are adapted to the political and ecological characteristics of a given region. The key difference with regional seas organizations is that RFMOs can adopt measures binding on their member States. Many RFMOs now include an ecosystem and precautionary approach to fisheries.

“While such provisions do not confer upon RFMOs the mandate to regulate activities other than fisheries, they generally allow them to conduct cumulative impact assessments to evaluate the aggregate effects of human activities on the ecosystems in their regulatory area.” (Diz and Ntona, 2018, [19])

Nevertheless, RFMOs are still not cooperating with other organizations to the extent necessary to ensure cross-sectoral cooperation for MPAs, other area-based management and risk assessments “in adopting integrated and coherent conservation and management measures within ecologically meaningful boundaries (or ecosystem-based units/ functional units).” (Diz and Ntona, 2018; Kenny *et al.*, 2018). Thus their sector-focused approach to management still poses an obstacle to the integrated management of fisheries (Leyroy and Morin, 2018; Pentz *et al.*, 2018).

For that reason, synergies between the regional seas programmes and RFMOs have been pursued. One approach has been to focus on large marine ecosystem (LMEs)<sup>31</sup>, wide areas of ocean space along the planet’s continental margins, spanning 200,000km<sup>2</sup> or more. LMEs are another type of ABMT that include both ocean space and connected coastal land areas, such as river basins and estuaries (Sherman and Alexander, 1986), to maintain and restore ecosystem functions. As discussed in **Section 3.3** below, the establishment of the Benguela Current Commission between Angola, Namibia, and South Africa as the three States which border the LME is an example of

---

<sup>30</sup> See [www.ospar.org/about/international-cooperation/abidjan-convention](http://www.ospar.org/about/international-cooperation/abidjan-convention)

<sup>31</sup> See [www.lmehub.net/](http://www.lmehub.net/)

transformative ocean governance. The connection between regional seas programmes, RFMOs and LMEs is being deepened by the Sustainable Ocean Initiative, led by the CBD (CBD, 2016).

Against this background, a case study will serve to illustrate progress and continued challenges in creating MPAs as a leading ABMT methodology that is integral to marine spatial planning for balancing ocean uses to support sustainable development and enhance ocean governance. (Kirkman *et al.*, 2019; Finke *et al.*, 2020). The next sub-section will thus identify lessons learnt in ensuring integrative and inclusive ocean governance, understood as inclusivity of diverse representative species and biodiversity hotspots, as well as of varied human dependences on marine ecosystems through stakeholder engagement, securing of resource rights, and the recognition of indigenous and local knowledge systems which can contribute to biodiversity conservation goals (MacKinnon *et al.*, 2015).

### **3.3 Experiments in Integrated and Inclusive Approaches: the Benguela Current Commission and South Africa's MSP process**

The Benguela Current Commission is a notable example of integrating and upscaling efforts between the regional seas programme, RFMO and a Large Marine Ecosystem (CBD, 2016).<sup>32</sup> The establishment of the Commission resulted from the cooperation over two decades in ocean governance between Angola, Namibia, and South Africa towards a multi-sectoral ocean governance approach.<sup>33</sup> Cooperation culminated in several international instruments, including the 1999 Strategic Action Programme for the Ecosystem, which was given effect through a voluntary 2007 Interim Agreement on the Establishment of the Benguela Current Commission.<sup>34</sup> This was to ensure effective longstanding transboundary cooperation and the sustainable management and protection of the LME (O'Toole and Shannon, 2003). In 2013, the Interim Agreement was replaced

---

<sup>32</sup> See [www.benguelacc.org/index.php/en/component/docman/doc\\_download/113-interim-agreement-english](http://www.benguelacc.org/index.php/en/component/docman/doc_download/113-interim-agreement-english).

<sup>33</sup> Two noteworthy regional cooperative initiatives were the Benguela-Environment-Fisheries Interaction & Training (BENEFIT) and the BCLME Programmes. The BENEFIT programme goal was to increase the science capability required for the optimal and sustainable utilization of marine living resources of the BCLME. The BCLME Programme with the goal "to sustain the ecological integrity of the BCLME through integrated transboundary ecosystem management". For more information refer to O'Toole, and Shannon (2003).

<sup>34</sup> See [www.benguelacc.org/index.php/en/component/docman/doc\\_download/113-interim-agreement-english](http://www.benguelacc.org/index.php/en/component/docman/doc_download/113-interim-agreement-english)

by the Benguela Current Convention (BCC), cementing the legal status of the Benguela Current Commission.<sup>35</sup>

Several remarkable features of the BCC make it a good basis for more inclusive and integrative ocean governance. First, the BCC addresses the complex legacy of fragmented governance left by colonial and political histories (Cochrane *et al.*, 2009), including with Angola's independence and 40 years of debilitating war (Cochrane *et al.*, 2009), Namibia's independence from South Africa,<sup>36</sup> and the end of apartheid in South Africa (Finke *et al.*, 2020), with the social impacts spilling over into the establishment and effectiveness of South Africa's MPA system (Sowman and Sunde, 2018).

Secondly, the Commission links the Benguela Current Large Marine Ecosystem with the neighboring Agulhas and Somali LMEs, which is vital, as these boundaries are highly dynamic and the neighboring warmer waters directly influence the Benguela ecosystem and its living marine resources (Heileman and O'Toole, 2001). Thirdly, the arrangement reinforces the framework under the Abidjan Regional Seas Convention, as well as relevant regional fisheries arrangements.<sup>37</sup> Finally, there is an established linkage between the Benguela Current Commission and the Orange-Senqu Commission which comprises the four riparian States<sup>38</sup> fed by the largest river discharging into the Benguela LME (Finke *et al.*, 2020). This in turn allows to link ocean management with a wetland of international importance under the Ramsar Convention.<sup>39</sup>

The BCC allows its members to manage transboundary resources holistically while balancing different ocean users' needs with conservation imperatives. Its objective is "to promote a coordinated regional approach to the long-term conservation, protection, rehabilitation, enhancement and sustainable use of the [LME], to provide economic, environmental and social benefits" (BCC, Art. 2). According to the BCC, member States must be guided by principles on

---

<sup>35</sup> Adopted 18 March 2013, in force, 10 December 2015. Adopted: 18.03.2013; EIF: 10.12.2015. Available at <[www.benguelacc.org/index.php/en/component/docman/doc\\_download/695-signedbenguela-current-convention-english](http://www.benguelacc.org/index.php/en/component/docman/doc_download/695-signedbenguela-current-convention-english)>.

<sup>36</sup> In regard to the complex legacy it is between South Africa and Namibia which was formally known as South West Africa Namibia. For more detail refer to Devine (1986); Security Council Resolution 276 (1970); and *Advisory Opinion on Legal Consequences for States of the Continued Presence of South Africa in Namibia/ South West Africa*, ICJ Rep. 16, 1970.

<sup>37</sup> See FAO, Regional Fisheries Bodies Map Viewer: [www.fao.org/figis/geoserver/factsheets/rfbs.html](http://www.fao.org/figis/geoserver/factsheets/rfbs.html)

<sup>38</sup> The whole of Lesotho and parts of Botswana, Namibia, and South Africa

<sup>39</sup> See [www.iucn.org/regions/eastern-and-southern-africa/about/our-work/water-and-wetlands/usaidiucn-programme-applying-ecosystem-approach-orange-senqu-basin/locations/south-africa](http://www.iucn.org/regions/eastern-and-southern-africa/about/our-work/water-and-wetlands/usaidiucn-programme-applying-ecosystem-approach-orange-senqu-basin/locations/south-africa)

sustainable use and management, precautionary and prevention (BCC, Art. 4; Vrancken, 2011), thereby providing the legal basis for integrative and anticipatory governance.

Member States and the Commission are guided by a five-year Strategic Action Programme (Hamukuaya, *et al.*, 2016), which addresses the following eight themes: living marine resources; non-living marine resources; productivity and environmental variability; pollution; ecosystem health and biodiversity; human dimensions; enhance the economic development potential; and governance (Hamukuaya, 2020). The Strategic Action Programme is based on a transboundary diagnostic analysis, consisting of a scientific and technical assessment to identify important transboundary issues related to the marine environment and their impacts on the environment and socio-economy of the region (Hamukuaya *et al.*, 2016). Both instruments are reviewed and updated after every five years.<sup>40</sup> The Commission included marine spatial planning into its 2015–2019 Strategic Action Programme (Finke *et al.*, 2020) to support a variety of ecosystems and sectors, make contributions to the existing economies of member States, and tackle increasing demands on the region’s marine space (Finke *et al.*, 2020). This is in line with the progress already made under the Benguela Ecologically or Biologically Significant Areas Project (Kirkman *et al.*, 2019), the Second National Biodiversity Strategy and Action Plan (to implement the CBD) of Namibia<sup>41</sup> and Angola,<sup>42</sup> and the three countries’ commitment to implementing an ecosystem approach to fisheries (Kirkman *et al.*, 2016).

Through the Benguela Current Commission, a regional working group for MSP was established to foster cooperation between different stakeholders (Finke *et al.*, 2020), including government officials, technical experts, and representatives of civil society, supporting the implementation of MSP within the three States and enabling information exchange, mutual learning and capacity building in the form of expertise (Finke *et al.*, 2020). These are not limited to the region: the regional working group has engaged with the European Commission, the Baltic Marine Environment Protection Commission, and the Baltic Sea Spatial Planning Organization (Finke *et al.*, 2020). A valuable output from the regional working group is enabling a uniform approach to MSP in the region (Finke *et al.*, 2020). For the successful implementation of MSP

---

<sup>40</sup> The Benguela Current Commission has undertaken to update the SAP document as the current one “expired” in 2019.

<sup>41</sup> See <http://extwprlegs1.fao.org/docs/pdf/nam169118.pdf>.

<sup>42</sup> See [www.cbd.int/doc/world/ao/ao-nbsap-v2-en.pdf](http://www.cbd.int/doc/world/ao/ao-nbsap-v2-en.pdf).

within the region, however, extensive data is required on the state of the marine area, the impact of human activities, and the effect of external pressures such as climate change.

To date, the Benguela Current Commission has undertaken projects to inform the regional MSP process, such as the spatial biodiversity assessment of marine and coastal biodiversity in the ecosystem, focusing on the ecosystem threat status, ecosystem protection levels, and priority areas for protection (Holness *et al.*, 2012). In addition, through the Marine Spatial Management and Governance Project (MARISMA), member States have been supported in describing the region's ecologically or biologically significant marine areas (EBSAs), in line with the CBD, as part of MSP.

The main challenge facing the Benguela Current Commission, in addition to lack of long-term funding for the MSP process, is how to engage with stakeholders across different sectors as part of its efforts to strategically organize the use of the marine space, to avoid conflicts and limit threats while ensuring the long-term sustainable development of the blue economy in the region.<sup>43</sup> The challenge facing the Commission is, therefore, encompassing inclusive, transdisciplinary and adaptive governance.

Regarding national efforts, there are currently no MPAs legislated in Angola.<sup>44</sup> In Namibia, the Namibian Islands are currently the sole MPA, but will be one of seven marine areas which have been described as an Ecologically or Biologically Significant Area under the CBD (Finke *et al.*, 2020). South Africa has legislated forty-four MPAs in line with Operation Phakisa MPA Network.<sup>45</sup> Of the three States, only South Africa promulgated legislation specifically on marine spatial planning (Marine Spatial Planning Act of 2018). Nevertheless, Namibia and Angola have

---

<sup>43</sup> For example, the successful implementation of MSP in South Africa hinges upon elaborating marine spatial plans within the framework of South Africa's MPAs, based on increasing representation of marine habitats, benchmarking and precaution. Sowman and Sunde, however, underscored that a failure to address social impacts under Operation Phakisa, including historical injustices experienced by communities in the establishment of MPAs, has led to growing discontent among coastal fishing communities. The *Gongqose and Others v Minister of Agriculture, Forestry and S* (1340/16, 287/17) [2018] ZASCA 87 is an example of South African case law where these conflicts were present.

<sup>44</sup> Even though Angola has no marine protected area (MPAs) at present, but the government has recognised the potential of the blue economy and expanded the mandate of the Ministry of Fisheries. It launched a marine spatial plan to address conflicting uses of marine resources and is planning to set up the first MPA contiguous with Angola's largest national park. These plans are coupled with the doubling of terrestrial protected areas, which are impacted by illegal occupation of the vulnerable Quiçama coastline as a consequence of the Angolan war, but also after the peace in 2002.

<sup>45</sup> The Network is a unique initiative, developed in a unique context, with participation from seventeen ministries as part of the Operation Phakisa Oceans Economy Lab.

established similar institutional structures to South Africa, enabling different government agencies to work together to implement MSP through the National Working Groups by using experts of the MARISMA project (Finke *et al.*, 2020). The three States are thus developing plans sequentially to focus on one marine area at a time to integrate learning from one planning process into the next (Finke *et al.*, 2020).

In South Africa, researchers and government partners have identified Algoa Bay in the Eastern Cape as a case-study area for developing the first marine spatial plan, with a view to using lessons learnt for the development of marine area plans as set out in the Marine Spatial Planning Act (Dorrington *et al.*, 2018). Algoa Bay has been extensively researched and is home to government funded research platforms, therefore providing a substantial body of data, allowing an understanding and management of the complexity of legal and socio-economic requirements, on one hand, and environmental (physical, chemical and biological) considerations, on the other (Dorrington *et al.*, 2018). The development of the Algoa Bay marine spatial plan is following the IOC-UNESCO ten step approach, underpinned by the CBD ecosystem approach principles that include recognition of indigenous knowledge systems (CBD Decision V/6, 2000, Principle 11). This case study can, thus, become an entry point for recognizing human rights as part of the governance of the ocean and its resources, integrating different systems of knowledge. In addition, the case study is viewed through a systems approach lens and the development of system dynamic tools/models that provide opportunities for scenario planning and determining possible across-, inter-sectorial impacts and environmental impacts (Lombard *et al.*, 2019). Algoa Bay, therefore, entails a research-stakeholder-led “enabling approach” to develop capacities for the “governance of transformations” (i.e. governance to actively trigger and steer a transformation process).<sup>46</sup> It aims to bring together natural science findings and methods across fisheries, marine ecology and oceanography, with social sciences, law and art to support transdisciplinary, integrative, adaptive and inclusive ocean governance. Algoa Bay provides an example that could be scaled up not only to the national but also the regional level, including with a view to supporting the Benguela Current Commission and the Western Indian Ocean in constructively engaging with stakeholders over trade-offs, by expanding their current integrative and anticipatory governance approaches to include inclusive, adaptive and transdisciplinary approaches. Lessons learnt are providing guidance for the development of the Western Indian Marine Spatial Planning Strategy (Lombard

---

<sup>46</sup> See Chapter 1 in this volume.

*et al.*, 2021). This is for marine planning at a regional scale, rather than at local levels, which is considered key for the development of a sustainable blue economy (Friess and Grémaud-Colombier, 2019).

### 3.4 Ways forward

Among the possible ways forward for transformative ocean governance in all its dimensions at different scales, this Section will investigate the potential of the inter-dependence between human rights and marine biodiversity to address indirect drivers of biodiversity loss, including power dynamics.

From an international law perspective, even if the CBD and its guidelines do not use explicit human rights language, they have made significant conceptual and normative contributions to the relationship with human rights, specifically with regard to indigenous peoples' rights to natural resources (Morgera, 2018a). As a result, the CBD and its instruments have been increasingly relied upon by international human rights bodies (A/HRC/37/59, 2018). This recognition has implications both for national-level action, as well as for international cooperation, at the global and regional levels (A/HRC/34/49, 2017, paras. 36–48), and can have a bearing on the inclusiveness and integration of ocean governance. Notably, human rights can help address, from a legal perspective, the “politics of transformative change,”<sup>47</sup> preventing a shifting of the burden of response onto the vulnerable; paying attention to social differentiation, through the lens of non-discrimination; and addressing issues of power and legitimacy. In other words, human rights can serve to address questions of justice<sup>48</sup> in ocean governance. The integration of international human rights law into the interpretation and application of the law of the sea, however, is not very advanced (Barnes, 2018).

One way in which human rights considerations can be put into practice in the context of ocean governance, with a view to making it more integrated and inclusive, is reliance on the international legal concept of fair and equitable benefit-sharing, which is already included in the law of the sea and international human rights law, and has been elaborated upon under the CBD (Morgera, 2018b). As will be argued below, fair and equitable benefit-sharing can support

---

<sup>47</sup> Chapter 1 in this volume.

<sup>48</sup> Chapter 8 in this volume.

transformative governance in terms of framing and agenda setting, leadership, financial investment, capacity for learning, and increasing institutionalization.<sup>49</sup>

Fair and equitable benefit-sharing norms in the law of the sea are conceived narrowly in relation to deep-seabed mining and marine scientific cooperation (UNCLOS, Arts. 82(1) and (4), 242–244 and Part XI; Noyes, 2011; Salpin, 2013), and they are currently being developed with regard to bioprospecting in areas beyond national jurisdiction as part of the negotiations of a new legally binding instrument on marine biodiversity of these areas (Morgera, 2018–19). Benefit-sharing has, however, become a broader obligation in international biodiversity law (Morgera, 2016) arising from the conservation and sustainable use of natural resources (both within and outside national jurisdiction, beyond access to genetic resources) to address equity and sustainability issues as part of the ecosystem approach (*Contra* Baslar, 1998).<sup>50</sup> Along parallel lines, under international human rights law, benefit-sharing has been identified as a safeguard to protect the human rights of indigenous peoples (A/HRC/27/59, 2018, Principle 15; Morgera, 2019), small-scale fishing communities (A/RES/73/165, 2019; Morgera and Nakamura, (forth)) and rural women (CEDAW/C/GC/34, 2016), including in connection with their effective participation in the creation and management of protected areas. In addition, benefit-sharing is part and parcel of the human right to science (the right of everyone to benefit from scientific advancements), which reveals the human rights dimensions of inter-State obligations related to scientific cooperation, capacity-building and technology transfer (International Covenant on Economic, Social and Cultural Rights, Art. 15(3); Morgera, 2015).

That said, benefit-sharing implementation is often dominated by a transactional logic to obtain a “green light” for conservation or development projects, rather than redress power asymmetries that threaten biodiversity conservation and sustainable use (Martin *et al.*, 2014). A different interpretation, however, emerges from CBD guidance that is more aligned with human rights standards. This interpretation focuses on the active participation of beneficiaries in the identification of benefits, which relies on an iterative, concerted and good-faith dialogue to develop a common understanding as part of mutual learning and an adaptive approach. Based on a combined reading of interpretative materials, “sharing” principally conveys the idea of agency, as

---

<sup>49</sup> Chapter 1 in this volume, referring to Chaffin *et al.*, 2016.

<sup>50</sup> Who instead suggested that common heritage as such should be applied to other natural resources of different international legal status as a functional rather than territorial concept.

opposed to the passive enjoyment of benefits (Mancisidor, 2015), and therefore a shift away from unidirectional (likely, top-down) or one-off flows of benefits. In addition, benefit-sharing usually relies on a menu of benefits, the nature of which can be economic and non-economic. This arguably allows taking into account, through the concerted, dialogic process of sharing, the beneficiaries' needs, values, and priorities through a contextual selection of the combination of benefits that may best serve to lay the foundation for partnership (Morgera, 2016). The expressions "fair and equitable," which is generally left to subsequent negotiations, can be interpreted to express the rationale of balancing competing rights and interests (Burke, 2014), with a view to integrating both procedural and substantive dimensions of justice (Kläger, 2011) into a relationship regulated by international law that is characterized by power imbalances (Kläger, 2011).

Applied at the multilateral level, this interpretation of benefit-sharing can support the voice of developing countries in co-identifying the benefits and needs for transformative ocean governance through the integrated implementation of capacity-building, technology transfer, scientific cooperation and information-sharing obligations (Morgera, 2016). In particular, this can be applied to the creation and management of MPA networks, with a focus on equity and power imbalances in ocean science production and area-based management and impacts at local levels. It could also support the co-development of MPAs as integral components of ecosystem-based fisheries management based on better understanding of the dependence on ecosystem services for different actors and sectors. As the Post-2020 Global Biodiversity Framework indicates, this would be aligned with the broader goal of valuing and maintaining nature's contributions to people through conservation and sustainable use "for the benefit of all" and would take into account the importance of spatial approaches to this end:

"The number of people who can benefit from nature's contributions to people depends not only on nature's ability to provide the benefit, but also on societies' ability to manage their distribution, fairly and equitably, within and between generations." (CBD/SBSTTA/24/3.Add.2, 2021, para. 36)

This approach is aligned with the innovative theory of change in the Global Biodiversity Framework, which emphasizes "a whole-of-government and society approach" for transformative change and the role of a rights-based approach and cross-scale partnerships for ensuring that

“biodiversity is used sustainably in order to meet people’s needs”, notably gender equality, youth inclusion, and the full and effective participation of indigenous peoples and local communities in the implementation of this framework (CBD/POST2020/PREP/2/1, 2020).

This co-identification and delivery of benefits can be supported by a process of institutionalization:<sup>51</sup> multilateral facilitative and brokering arrangements can serve to operationalize relevant duties of cooperation with a view to ensuring equitable distribution across different regions, monitoring of effectiveness, and learning from experience. The need for such an approach has already been demonstrated in other international processes, such as the International Seabed Authority (ISA), and the International Maritime Organization (IMO) (Morgera and Ntona, 2018). In addition, benefit-sharing is a key element to recognize indigenous peoples and local communities for their global contributions to the conservation and sustainable use of biodiversity, and to respectfully integrate their knowledge systems<sup>52</sup> in relation to MPA creation and management at different levels. This could allow for the co-identification of benefits and needs for transformative ocean governance beyond the current State-centric model, with a view to enhancing both transdisciplinary and inclusive ocean governance.

The key elements of a benefit-sharing inspired multilateral approach to transformative ocean governance would then be the following:

- joined-up thinking on the implementation of various international obligations on scientific cooperation and information-sharing, financial and technological solidarity, capacity building, and their human rights dimensions (integrative and transdisciplinary governance);
- dialogue to enhance collaboration across sectors, among duty-bearers and human rights-holders, to contribute to the achievement of international biodiversity, ocean, climate change and human rights objectives (integrative governance);
- deliberation and mutual learning with a view to setting priorities to the benefit of the most vulnerable (inclusive governance);
- the provision of international institutional support for facilitating and brokering scientific cooperation opportunities;

---

<sup>51</sup> Chapter 1 in this volume.

<sup>53</sup> This is inspired and adapted from Morgera, Switzer and Geelhoed, Report to the European Commission on the Governance of Digital Sequence information (2020).

- co-identifying information-sharing, technology-transfer and regulatory and institutional capacity-building needs and available assistance; and
- building, and assessing the effects of, partnerships, including public-private partnerships (adaptive governance);
- multi-stakeholder identification and assessment of obstacles, co-development of proposals for enhancement, joint monitoring and reflection on lessons learnt on emerging transformative approaches (inclusive and adaptive governance); and
- transparency about, and assessment of, the distribution of benefits across regions, as well as to good practices and lessons learnt at the local, national and regional levels, with a view to ensuring fairness and equity in benefit-sharing (arising from the dialogue and incrementally shaping funding and governance across scales – adaptive governance).<sup>53</sup>

#### **4 Conclusions**

These elements could be applied in the context of area-based management and spatial approaches under the negotiations of an international instrument on marine biodiversity of areas beyond national jurisdiction (Morgera, forth 2021), and under the Sustainable Ocean Initiative. This Chapter focuses on the latter, as an already institutionalized opportunity for transformative governance. The Initiative has become a regular process to facilitate the exchange of experiences, to identify options and opportunities to enhance cross-sectoral collaboration towards internationally agreed goals, and to discuss the need for specific tools, guidelines or other initiatives to strengthen collaboration among not only regional seas conventions and RFMOs, but also sectoral international organizations like the Food and Agriculture Organization of the United Nations, the IMO and the ISA (Diz and Ntona, 2018). The Initiative could take the approach outlined above to understand the reasons why “many protected areas are not effectively or equitably managed”, as well as “the importance of focusing on biodiversity outcomes rather than spatial area” included within MPAs, and the “provision of ecosystem services and to maintain integrity of planetary ecological processes” (CBD/SBSTTA.24/3/Add.2, 2021, para. 54–56). Equally, the Initiative could provide a forum to reflect on equity issues across scales in inter-regional scientific cooperation notably in relation to carrying out fisheries assessments in data-

---

<sup>53</sup> This is inspired and adapted from Morgera, Swtizer and Geelhoed, Report to the European Commission on the Governance of Digital Sequence information (2020).

poor environments (Kenny *et al.*, 2018), implementation of the precautionary approach to fisheries (UNFSA, Art. 6 and Annex II; A/Conf.210/2016/5, 2016, para. 36), habitat protection in the context of conflicts of use (i.e., fishing or fishing survey activities vs seismic activities) (NAFO, 2016), and the effects of climate change and ocean acidification on marine ecosystems (A/RES/72/73, 2018, para. 196). Furthermore, scientific and participatory methodologies for assessing coastal communities' and coastal and marine ecosystems' vulnerabilities to climate change and ocean acidification are a crucial area of scientific cooperation and capacity building to identify adaptation measures in most vulnerable regions (Cochrane *et al.*, 2017).

A reflection has already been started on the role of Regional Seas Programme for contributing to the Post-2020 Biodiversity Framework (CBD/SBSTTA/24/INF/24, 2021). Based on the key challenge facing the Benguela Current Commission and the findings from the Algoa Bay case-study in South Africa, the SOI could share learning across scales on integrating social and natural sciences insights, as well as different knowledge systems. This could support regional seas organizations to engage in complex stakeholder engagements and deliberations on trade-offs in a constructive manner, to maximize the potential for transformation, by expanding their current integrative and anticipatory governance approaches to inclusive, adaptive and transdisciplinary approaches. The Initiative could also provide a forum to engage with the increasing concentration of businesses in the blue economy and explore how to build fair partnerships with the private sector in the context of MPA networks at different scales (Viridin, 2021). These efforts could contribute to strengthening the adaptive and transdisciplinary governance dimensions of efforts on EBSAs and ABMTs across scales, contributing to implementing CBD obligations to monitor biodiversity components that require urgent conservation measures and those which offer the best potential for sustainable use through international technical and scientific cooperation on conservation and sustainable use of biodiversity (CBD, Art. 7 and 17–18). It could also support CBD Parties in providing the evidence base to identify processes with (likely) significant adverse impacts on biodiversity conservation and sustainable use (CBD, Art 7 (c)), as well as to assess and minimize adverse impacts (CBD, Art. 14), while building capacity by sharing cross-regional learning on transboundary MSP approaches (CBD, Art. 12; CBD/EBSA/EM/2017/1/INF/1, 2017).

At the national level, this rights-based interpretation of benefit-sharing could be explored as part of marine spatial planning processes. It could support bottom-up forms of deliberations (Cotula and Webster, 2020), characterized by the agency of beneficiaries, the respect of human rights,

and mutual understanding of different benefits and priorities in MPA creation and other area-based management tools, as well as in the sustainable use of marine resources and the advancement of ocean science. Such dialogues could be informed by inter- and trans-disciplinary research (Morgera *et al.*, 2021) to assist different actors in the respectful and constructive engagement with beneficiaries' choice and capabilities, their knowledge systems, as well as different worldviews of nature and development, and an understanding of different benefits and risks across scales (Ntona and Morgera, 2018). The partnership that is being built among researchers from different disciplines, different sectors of government, and different knowledge holders could also contribute to the contextual application of the precautionary principle and new technologies (anticipatory governance), through learning, experimentation and reflexivity (adaptive governance). Research is equally needed to document good practices in integrating the evidence base across marine sciences and social sciences through inclusive approaches, with a view to understanding barriers and opportunities to scaling up to the national, regional and international levels.

## Bibliography

Akiwumi, P., Melvasalo, T., 1998. UNEP's Regional seas programme: approach, experience and future plans. *Marine Policy* 22, 229–234.

Allan, E., Weisser, W. W., Fischer, M., *et al.*, 2013. A comparison of the strength of biodiversity effects across multiple functions. *Oecologia* 173, 223–237.

Barnes, R. A., 2018. Environmental rights in marine spaces. In Bogojevic & R Rayfuse (Eds.) *Environmental Rights in Europe and Beyond*. Hart, London, United Kingdom, pp. 49–84.

Beaugrand, G., Edwards, M., Raybaud, V., *et al.*, 2015. Future vulnerability of marine biodiversity compared with contemporary and past changes. *Nature Climate Change* 5, 695–701.

Birnie, P., Boyle, A. E., and Redgwell, C., 2009. *International Law and the Environment* 3<sup>rd</sup> ed. Oxford University Press, Oxford, United Kingdom.

Blasiak, R., Jouffray, J-B., Wabnitz, C. C., *et al.*, 2018. Corporate control and global governance of marine genetic resources. *Science Advances* 4, eaar5237.

Bogomolni, A. L., Gast, R. J., Ellis, J. C., *et al.* 2008. Victims or vectors: a survey of marine vertebrate zoonoses from coastal waters of the Northwest Atlantic. *Diseases of Aquatic Organisms* 81, 13–38.

Borrelle, S. B., Rochman, C. M., Liboiron, M., *et al.*, 2017. Opinion: why we need an international agreement on marine plastic pollution. *Proceedings of the National Academy of Sciences USA* 114, 9994–9997.

Burke, C., 2014. *An Equitable Framework for Humanitarian Intervention*, Hart Publishing, Oxford; Portland, OR, USA.

Casson, L., Alexander, J., Miller, K., *et al.*, 2020. Deep Trouble: The murky world of the deep sea mining industry 2020. Greenpeace International. Available online at <https://issuu.com/greenpeaceinternational/docs/pto-deep-trouble-report-final>.

CBD, 2016. Outcome of the Sustainable Ocean Initiative Global Dialogue with Regional Seas Organizations and Regional Fisheries Bodies on Accelerating Progress towards the Aichi Biodiversity Targets, held in Seoul from 26 to 28 September 2016 (“Seoul Outcome”). Available online at [www.cbd.int/doc/meetings/mar/soiom-2016-01/official/soiom-2016-01-outcome-en.pdf](http://www.cbd.int/doc/meetings/mar/soiom-2016-01/official/soiom-2016-01-outcome-en.pdf).

Cheung, W. W. L., 2016. Climate Change Effects on Illegal, Unreported and Unregulated Fishing. Available online at <https://nereusprogram.org/works/climate-change-effects-on-illegal-unreported-and-unregulated-fishing/>.

Cheung, W. W. L., Lam, W. Y. V., Sarmiento, J. L., *et al.*, 2009. Projecting global marine biodiversity impacts under climate change scenarios. *Fish and Fisheries* 10, 235–251.

Cochrane, K. L., Augustyn, C. J., Fairweather, T., *et al.*, 2009. Benguela current large marine ecosystem – Governance and management for an ecosystem approach to fisheries in the region. *Coastal Management* 37, 235–254.

Cochrane, K. L., Rakotondrazafy, H., Aswani, S., *et al.*, 2017, Report of the GLORIA Workshop, Antananarivo, Madagascar, 14-16 June 2016. Available online at [http://gullsworld.noc.ac.uk/docs/gloria\\_workshop\\_report\\_final.pdf](http://gullsworld.noc.ac.uk/docs/gloria_workshop_report_final.pdf).

Corlett, R. T., 2020. Impacts of the coronavirus pandemic on biodiversity conservation. *Biological Conservation* 246, 108571.

Cotula, L., Webster, E., 2020. COVID-19 and the Sites of Rights Resilience. Strathclyde Law School blogpost. Available online [www.strath.ac.uk/humanities/lawschool/blog/covid-19andthesitesofrightsresilience/](http://www.strath.ac.uk/humanities/lawschool/blog/covid-19andthesitesofrightsresilience/).

De Santo, E. M., 2018. Implementation challenges of area-based management tools (AMBTs) for biodiversity beyond national jurisdiction (BBNJ). *Marine Policy* 97, 34–43.

Devine, D. J., 1986. Some thoughts on the interim preservation of the Namibian fishing heritage. *Verfassung und Recht in Übersee* 19, 379–381.

DeVries, T., Le Quéré, C., Andrews, O., *et al.*, 2019. Decadal trends in the ocean carbon sink. *PNAS* 116, 11646–11651.

Diana, J. S., 2009. Aquaculture production and biodiversity conservation. *BioScience* 59, 27–38.

Dixon, D. I., Munday, P. L., Jones, G. P., 2010. Ocean acidification disrupts the innate ability of fish to detect predatory olfactory cues. *Ecology Letters* 13, 68–75.

Diz, D., 2017. Marine biodiversity: unravelling the intricacies of global frameworks and applicable concepts. In Morgera, E., Razzaque, J., (Eds.), *Encyclopaedia of Environmental Law: Biodiversity and Nature Protection Law*. Edward Elgar, Northampton MA, USA, pp. 123–144.

Diz, D., Johnson, D., Riddell, M., 2018. Mainstreaming marine biodiversity into the SDGs: The role of other effective area-based conservation measures (SDG 14.5). *Marine Policy* 93, 251–261.

Diz, D., Ntona, M., 2018. Background report for the Second Meeting of Sustainable Ocean Initiative Global Dialogue with Regional Seas Organizations and Regional Fisheries Bodies on Accelerating Progress towards the Aichi Biodiversity Targets and Sustainable Development Goals. On file with authors.

Dorrington, R. A., Lombard, A. T., Bornman, T G., *et al.*, 2018. Working together for our oceans: A marine spatial plan for Algoa Bay, South Africa. *South African Journal of Science*, 114, 1–6.

Eng, C. T., Paw, J. N., Guarin, F. Y., 1989. The environmental impact of aquaculture and the effects of pollution on coastal aquaculture development in Southeast Asia. *Marine Pollution Bulletin* 20, 335–343.

European Parliament, 2017. Report on the state of play of recreational fisheries in the European Union. 2017/2120(INI). Available online at: [www.europarl.europa.eu/doceo/document/A-8-2018-0191\\_EN.html?redirect#title2](http://www.europarl.europa.eu/doceo/document/A-8-2018-0191_EN.html?redirect#title2).

FAO, 2018. Impacts of climate change of fisheries and aquaculture: Synthesis of current knowledge, adaptation and mitigation options. *FAO Fisheries and Aquaculture Technical Paper* 627, FAO, Rome, Italy.

FAO, 2020. *State of World Fisheries and Aquaculture 2020. Sustainability in action*. FAO, Rome, Italy.

Feely, R. A., Sabine, C. L., Lee, K., *et al.*, 2004. Impact of anthropogenic CO<sub>2</sub> on the CaCO<sub>3</sub> system in the oceans. *Science* 305, 362–366.

Finke, G., Gee, K., Gxaba, T., *et al.*, 2020. Marine Spatial Planning in the Benguela Current Large Marine Ecosystem. *Environmental Development* 36, 100569.

- Finke, G., Gee, K., Kreiner, A., Amunyela, M., Braby, R., 2020. Namibia's way to Marine Spatial Planning – Using existing practices or instigating its own approach? *Marine Policy* 121, 104107.
- Gattuso, J. P., Magnan, A., Billé, R., *et al.*, 2015. Contrasting futures for ocean and society from different anthropogenic CO<sub>2</sub> emissions scenarios. *Science* 349, aac4722.
- Guston, D. H., 2014. Understanding 'anticipatory governance'. *Social Studies of Science* 44, 218–242.
- Hamukuaya, H., 2020. Benguela Current Convention supports ecosystem assessment and management practice. *Environmental Development* 36, 100574.
- Hamukuaya, H., Attwood, C., Willemse, N., 2016. Transition to ecosystem-based governance of the Benguela Current Large Marine Ecosystem. *Environmental Development* 17, 310–321.
- Haward, M., 2018. Plastic pollution of the world's seas and oceans as a contemporary challenge in ocean governance. *Nature Communications* 9:667.
- Holmer, M., 2010. Environmental issues of fish farming in offshore waters: perspectives, concerns and research needs. *Aquaculture Environment Interactions* 1, 57–70.
- Holness, S., Wolf, T., Lombard, M., *et al.*, 2012. Spatial biodiversity assessment and spatial management, including marine protected areas: Report on progress. Available online at [www.benguelacc.org/index.php/en/component/docman/doc\\_download/311-project-beh-09-01-spatial-biodiversity-assessment](http://www.benguelacc.org/index.php/en/component/docman/doc_download/311-project-beh-09-01-spatial-biodiversity-assessment).
- IPBES, 2019. Summary for policymakers of the global assessment report on biodiversity and ecosystem services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services. Díaz, S., *et al.*, (Eds.) IPBES Secretariat, Bonn, Germany.
- IPCC, 2018. Global Warming of 1.5C - Summary for Policymakers. Masson-Delmontte, V., *et al.*, (Eds.). World Meteorological Organization, Geneva, Switzerland.
- IPCC, Special Report on the Ocean and Cryosphere in a Changing Climate, Summary for Policy Makers. 2019. Pörtner, H-O *et al.*, (Eds.). In press.
- Isensee, K., Valdes, L., 2015. GSDR 2015 Brief: Marine Litter: Microplastics. IOC/UNESCO. Available online at <https://sustainabledevelopment.un.org/content/documents/5854Marine%20Litter%20-%20Microplastics.pdf>.
- Jamieson, A. J., Singleman, G., Linley, T. D., Casey, S., 2020. Fear and loathing of the deep ocean: why don't people care about the deep sea? *ICES Journal of Marine Science*, fsaa234.
- Johnson, D., Froján, C. B., Bax, N., *et al.*, 'The global ocean biodiversity initiative: Promoting

scientific support for global ocean governance. *Aquatic Conservation* 29, 162–169.

K Baslar, 1998. *The Concept of the Common Heritage of Mankind in International Law*, Martinus Nijhoff, Leiden, Netherlands.

Kelly, C., Ellis, G., Flannery, W., 2019. Unravelling persistent problems to transformative marine governance. *Frontiers in Marine Science* 6:213.

Kenny, A. J., Campbell, N., Koen-Alonso, M., *et al.*, Delivering Sustainable Fisheries through Adoption of a Risk-based Framework as Part of an Ecosystem Approach to Fisheries Management. *Marine Policy* 93, 232–240.

Kimball, L. A., 2001. *International Ocean Governance: Using International Law and Organizations to Manage Marine Resources Sustainably*. IUCN, Gland, Switzerland and Cambridge, United Kingdom.

Kirkman, S. P., Holness, S., Harris, L.R., *et al.*, 2019. Using systematic conservation planning to support marine spatial planning and achieve marine protection targets in the transboundary Benguela ecosystem. *Ocean & Coastal Management* 168, 117–129.

Kläger, R., 2011. *Fair and Equitable Treatment’ in International Investment Law*, Cambridge University Press, Cambridge, United Kingdom.

Kleypas, J. A., Buddemeier, R. W., Archer, D., *et al.*, 1999. Geochemical consequences of increased atmospheric carbon dioxide on coral reefs. *Science* 284, 118–120.

Laffoley, D., Baxter, J. M., (Eds.) 2019. *Oxygen deoxygenation: everyone’s problem: causes, impacts, consequences and solutions*. IUCN, Gland, Switzerland. Available online at: <https://doi.org/10.2305/IUCN.CH.2019.13.en>

Leroy, A., Morin, M., 2018. Innovation in the decision-making process of the RFMOs. *Marine Policy* 97, 156–162.

Levin, L. A., Wei, C-L., Dunn, D. C., *et al.*, 2020. Climate change considerations are fundamental to management of deep-sea resource extraction. *Global Change Biology* 26, 4664–4678.

MacKinnon, C. J. Lemieux, K. Beazley, S., *et al.* 2015. Canada and Aichi Biodiversity Target 11: understanding ‘other effective area-based conservation measures’ in the context of the broader target. *Biodiversity and Conservation* 24, 3559–3581.

Mancisidor, M., 2015. Is there such a thing as a human right to science in International Law? *European Society of International Law* 4, 1–6.

Martin, A., Akol, A., Phillips, J., 2014. Just conservation? On the fairness of sharing benefits. In Sikor, T., (Ed.), *The Justices and Injustices of Ecosystem Services*, Routledge, London, United Kingdom, 69–89.

- Mazzega, P., 2018. On the ethics of biodiversity models, forecasts and scenarios. *Asian Bioethics Review* 10, 295–312.
- Miller, K. A., Thompson, K. F., Johnston, P., Santillo, D., 2018. An overview of seabed mining including the current state of development, environmental impacts, and knowledge gaps. *Frontiers in Marine Science* 4:418.
- Minx J. C., Callaghan M., Lamb W. F., Garard J., Edenhofer, O., 2017. Learning about climate change solutions in the IPCC and beyond. *Environmental Science and Policy* 77, 252–259.
- Molinos, J. G., Halpern, B. S., Schoeman, D. S., *et al.*, 2016. Climate velocity and the future global redistribution of marine biodiversity. *Nature Climate Change* 6, 83–88.
- Morand, S., Lajaunie, C., 2017. Loss of biological diversity and emergence of infectious Diseases. In Morand, S., Lajaunie, C., (Eds.) *Biodiversity and Health* 1<sup>st</sup> ed. Elsevier, Amsterdam, Netherlands 2017 pp. 29–47.
- Morgera, E., (Forthcoming 2021). The relevance of the human right to science for the conservation and sustainable use of marine biodiversity of areas beyond national jurisdiction: a new legally binding instrument to support co-production of ocean knowledge across scales. In De Lucia, V., Nguyen, L., Oude Elferink, A. G., (Eds.), *International Law and Marine Areas beyond National Jurisdiction: Current Status and Future Trends* (Forthcoming 2021).
- Morgera, E., 2011. Far Away, So Close: A Legal Analysis of the Increasing Interactions between the Convention on Biological Diversity and Climate Change Law. *Climate Law* 2, 85–115.
- Morgera, E., 2015. Fair and Equitable Benefit-sharing at the Crossroads of the Human Right to Science and International Biodiversity Law. *Laws* 4, 803–831.
- Morgera, E., 2016. The need for an international legal concept of fair and equitable benefit-sharing. *European Journal of International Law* 27, 353–383.
- Morgera, E., 2017. Ecosystem and Precautionary Approach. In Morgera, E., Razzaque, J., (Eds.), *Encyclopaedia of Environmental Law: Biodiversity and Nature Protection Law*. Edward Elgar, Northampton MA, USA pp. 70–80.
- Morgera, E., 2018-19. Fair and equitable benefit-sharing in a new international instrument on marine biodiversity: A principled approach towards partnership building? *Maritime Safety and Security Law Journal* 5, 48–77.
- Morgera, E., 2018a. Dawn of a New Day? The Evolving Relationship between the Convention on Biological Diversity and International Human Rights Law. *Wake Forest Law Review* 54, 691–712.

- Morgera, E., 2018b. Fair and Equitable Benefit-sharing. In Orlando, E., Krämer, L., (Eds.) *Encyclopedia of Environmental Law: Principles of Environmental Law*. Edward Elgar, Cheltenham, United Kingdom, pp 323–337.
- Morgera, E., 2019. Under the radar: fair and equitable benefit-sharing and the human rights of indigenous peoples and local communities connected to natural resources. *International Journal of Human Rights* 23, 1098-1139.
- Morgera, E., 2020. Biodiversity as a Human Right and its Implications for the EU's External Action. Report to the European Parliament. Available online at [www.europarl.europa.eu/RegData/etudes/STUD/2020/603491/EXPO\\_STU\(2020\)603491\\_EN.pdf](http://www.europarl.europa.eu/RegData/etudes/STUD/2020/603491/EXPO_STU(2020)603491_EN.pdf).
- Morgera, E., Nakamura, J., (Forthcoming). Shedding a Light on the Human Rights of Small-scale Fisherfolk: Complementarities and Contrasts between the UN Declaration on Peasants' Rights and the Small-Scale Fisheries Guidelines. In Bruonori, M., *et al.*, *Commentary on the Declaration on the Rights of Peasants* (Forthcoming).
- Morgera, E., Ntona, M., 2018. Linking Small-Scale Fisheries to International Obligations on Marine Technology Transfer. *Marine Policy* 93, 214–222.
- Morgera, E., Parks, L., Schroeder, M., 2021. Methodological challenges of transnational environmental law. In Heyvaert, V., Duvic-Paoli, L. A., (Eds.), *Research Handbook on Transnational Environmental Law*. Edward Elgar, Cheltenham, United Kingdom, pp. 48–65.
- Mossop, J., 2007. Protecting Marine Biodiversity on the Continental Shelf Beyond 200 Nautical Miles. *Ocean Development & International Law* 38, 283–304.
- Munday, P. L., Dixon, D. L., Donelson, J. M., *et al.*, 2009. Ocean acidification impairs olfactory discrimination and homing ability of a marine fish. *Proceedings of the National Academy of Sciences of the United States of America* 106, 1846–1852.
- NAFO, 2016. Report of the NAFO Joint Fisheries Commission – Scientific Council Working Group on Ecosystem Approach Framework to Fisheries Management (WG-EAFFM). FC-SC Doc. 16/03. Available online at [www.nafo.int/Library/FC-SC-documents/2016-fisheries-commission-scientific-council-documents](http://www.nafo.int/Library/FC-SC-documents/2016-fisheries-commission-scientific-council-documents).
- NIC, 2016. Global implications of illegal, unreported and unregulated (IUU) fishing. Available online at <https://fas.org/irp/nic/fishing.pdf>.
- Noyes, J. E., 2011. The Common Heritage of Mankind: Past, Present and Future. *Denver Journal of International Law & Policy* 40, 447–471.
- Ntona, M., Morgera, E., 2018. Connecting SDG 14 with the other Sustainable Development Goals through Marine Spatial Planning. *Marine Policy* 93, 214–222.

- O'Toole, M., Shannon, V., 2003. Sustainability of the Benguela: ex Africa semper aliquid novi. In Hemper, G., Sherman, K., (Ed.) *Large Marine Ecosystems of The World: Trends in Exploitation, Protection and Research*. Elsevier, Amsterdam, Netherlands, pp. 227-253.
- Ostfeld, R. S., 2009. Biodiversity loss and the rise of zoonotic pathogens. *Clinical Microbiology and Infection* 15, 40–43.
- Páez-Osuna, F., 2001. The environmental impact of shrimp aquaculture: a global perspective, *Environmental Pollution* 112, 229–231.
- Pentz, B., Klenk, N., Ogle, S., Fisher, J. A. D., 2018. Can regional fisheries management organizations (RFMOs) manage resources effectively during climate change? *Marine Policy* 92, 13–20.
- Rees, S., Foster, N. L., Langmead, O., Pittman, S., Johnson, D., 2018. Defining the qualitative elements of Aichi Biodiversity Target 11 with regard to the marine and coastal environment in order to strengthen global efforts for marine biodiversity conservation outlined in the United Nations Sustainable Development Goal 14. *Marine Policy* 93, 241–250.
- Rees, S., Sheehan, E. V., Stewart, B. D., *et al.*, 2020. Emerging themes to support ambitious UK marine biodiversity conservation. *Marine Policy* 117, 1-10.
- Sabine, C. L., Feely, R. A., Gruber, N., *et al.*, 2004. The ocean sink for anthropogenic CO<sub>2</sub>. *Science* 305, 367–371.
- Sala, E., Mayorga, J., Bradley, D., *et al.*, 2021. Protecting the global ocean for biodiversity, food and climate. *Nature* 592, 397–402.
- Salpin, C., 2013. The Law of the Sea: A before and after Nagoya? in Morgera, E., Buck, M., Tsioumani, E., (Eds.) *The 2010 Nagoya Protocol on Access and Benefit-Sharing in Perspective: Implications for International Law and National Implementation*. Brill/Martinus Nijhoff, Leiden, Netherlands, pp. 149–183.
- Serrao-Neumann, S., Davidson, J. L., Baldwin, C. L., 2016. Marine governance to avoid tipping points: Can we adapt the adaptability envelope? *Marine Policy* 65, 56–67.
- Sherman, K., Alexander, L. M., (Eds.). 1986. *Variability and management of large marine ecosystems*. AAAS Selected Symposium 99, Westview Press, Boulder, CO, USA.
- Singh, G. G., Cisneros-Montemayor, A. M., Swartz, W., *et al.*, 2018. A rapid assessment of co-benefits and trade-offs among sustainable development goals. *Marine Policy* 93, 223–231.
- Sowman, M., Sunde, J., 2018. Social impacts of marine protected areas in South Africa on coastal fishing communities. *Ocean & Coastal Management* 157, 168–179.

- Spijkers, J., Singh, G., Blasiak, R., *et al.*, 2019. Global patterns of fisheries conflict: Forty years of data. *Global Environmental Change*, 101921.
- Stocker, T. F., *et al.*, (Eds.). 2013. AR5 Climate Change 2013: The physical science basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge University Press, Cambridge, United Kingdom.
- Sumaila, U. R., Ebrahim, N., Schuhbauer A., *et al.*, 2019. Updated estimates and analysis of global fisheries subsidies. *Marine Policy* 109, 103695.
- Tovar, A., Moreno, C., Manuel-Vez, M. P., García-Vargas, M., 2000. Environmental impacts of intensive aquaculture in marine waters. *Water Research* 34, 334–342.
- Tsutsumi, H., Kikuchi, T., Tanaka, M., *et al.*, 1991. Benthic faunal succession in a cove organically polluted by fish farming. *Marine Pollution Bulletin* 23, 233–238.
- UNEP-WCMC, 2012. Promoting synergies within the cluster of biodiversity-related multilateral environmental agreements. UNEP-WCMC, Cambridge, United Kingdom. Available online at [www.cbd.int/doc/nr/Promoting\\_synergies\\_in\\_the\\_biodiversity\\_cluster.pdf](http://www.cbd.int/doc/nr/Promoting_synergies_in_the_biodiversity_cluster.pdf).
- UNEP, 2017. Regional Seas programmes covering Areas Beyond National Jurisdictions. Regional Seas Reports and Studies No. 202. Available online at [www.un.org/Depts/los/biodiversityworkinggroup/Regional\\_seas\\_programmes\\_ABNJ.pdf](http://www.un.org/Depts/los/biodiversityworkinggroup/Regional_seas_programmes_ABNJ.pdf).
- UNESCO, 2020. United Nations Decade of Ocean Science for Sustainable Development, Implementation Plan, Version 2.0. Available online at <https://oceanexpert.org/document/27347>.
- Viridin, J., Vegh, R., Jouffray, J. -B., *et al.*, 2021. The Ocean 100: Transnational corporations in the ocean economy. *Scientific Advances* 7, eabc8041.
- Viridin, J., Vegh, T., Jouffray, J. -B., *et al.*, 2021. The ocean 100: Transnational corporations in the ocean economy. *Science Advances* 7, eabc8041.
- Vrancken, H. G., 2011. South Africa and the Law of the Sea. Brill, Leiden, Netherlands.
- Waltzek, T. B., Cortés-Hinojosa, Wellehan, J. F. X., Wellehan, Gray G, C., 2012. Marine mammal zoonoses: A review of disease manifestations. *Zoonoses and Public Health* 59, 521–535.
- Warner, R., 2019. Area-based management tools developing regulatory frameworks for areas beyond national jurisdiction. *Asia-Pacific Journal of Ocean Law and Policy* 4, 142–157.
- Watson-Wright, W., Valdés, J. L., 2018. Fragmented Governance of Our One Global Ocean. In P. Boudreau *et al.*, (Eds.) *The Future of Ocean Governance and Capacity Development - Essays in Honor of Elisabeth Mann Borgese (1918–2002)*. Brill Nijhoff, Leiden, Netherlands, pp.16–22.

To appear in Visseren-Hamakers, I.J. and Kok, M. (eds),  
*Transforming Biodiversity Governance* (Cambridge University Press, forth 2021)

World Health Organization and Secretariat of the Convention on Biological Diversity (WHO/CBD), 2015. State of Knowledge Review on Biodiversity and Health, Connecting Global Priorities: Biodiversity Human Health. Available online at [www.cbd.int/health/doc/Summary-SOK-Final.pdf](http://www.cbd.int/health/doc/Summary-SOK-Final.pdf).