INTERNATIONAL TRIBUNAL FOR THE LAW OF THE SEA

(CASE NO. 31)

REQUEST FOR AN ADVISORY OPINION SUBMITTED BY THE COMMISSION OF SMALL ISLAND STATES ON CLIMATE CHANGE AND INTERNATIONAL LAW (REQUEST FOR ADVISORY OPINION SUBMITTED TO THE TRIBUNAL)

WRITTEN STATEMENT OF THE ONE OCEAN HUB (OOH)

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UK Research and Innovation

GCRF Global Challenges Research Fund

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I. Introduction

1. On 26 August 2022, the Commission of Small Island States on Climate Change and International Law decided, by consensus of its six Member States,[1] pursuant to article 3(5) of the Agreement for the Establishment of the Commission,[2] to submit a request for an advisory opinion from the International Tribunal for the Law of the Sea on the following questions:

> "What are the specific obligations of State Parties to the United Nations Convention on the Law of the Sea (the "UNCLOS"),
>
> (a) to prevent, reduce and control pollution of the marine environment in relation to the deleterious effects that result or are likely to result from climate change, including through ocean warming and sea level rise, and ocean acidification, which are caused by anthropogenic greenhouse gas emissions into the atmosphere?
>
> (b) to protect and preserve the marine environment in relation to climate change impacts, including ocean warming and sea level rise, and ocean acidification?"

2. The One Ocean Hub[3] is an international programme of collaborative research for sustainable development, working to promote fair and inclusive decision-making for a healthy ocean whereby people and planet flourish. The Hub brings together coastal people, researchers, decision-makers, civil society, and international organisations to value, and learn from, different knowledge systems and voices. The Hub is funded by UK Research and Innovation (UKRI) through the Global Challenges Research Fund (GCRF) (Grant Ref: NE/S008950/1) and brings together expertise in the marine and social sciences, law, economics and arts from 20 research institutions in the UK, South Africa, Ghana, Namibia, as well as the two regional universities (the University of West Indies and the University of the South Pacific). The Hub includes among its partners various UN bodies: the UN Division on Ocean Affairs and the Law of the Sea (UNDOALOS); the UN Environment Programme; the Food and Agriculture Organization of the United Nations; the Secretariat of the Convention on Biological Diversity; UNESCO-IOC; and the UN Development Programme. In addition, the Hub has collaborated with the UN Office of the High Commissioner for Human Rights; the UN Special Rapporteurs on Human Rights and the Environment, and on the Right to Food; the Children's Environmental Rights Initiative; the Global Network for Human Rights and the Environment; the Danish Institute for Human Rights, and IUCN People and the Ocean.

II. Scope, objective and structure of the OOH written statement in relation to Case No. 31

3. We wish to share our latest research on mutually supportive interpretations of the law of the sea, international climate change law, international biodiversity law and international human rights law, which is supported by inter-disciplinary findings from the marine and social sciences on the role of marine biodiversity to contribute to climate change mitigation and adaptation. In spite of the interconnectivity between the climate, the ocean and biodiversity, and their

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[1] Antigua and Barbuda, Niue, Palau, Saint Lucia, Tuvalu and Vanuatu.

[2] Agreement for the Establishment of the Commission of Small Island States on Climate Change and International Law (adopted 31 October 2021, entered into force 31 October 2021) (56940 UNTS).

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interdependency with human rights, their respective applicable legal frameworks are fragmented and require mutually supportive interpretation.[4]

4. In particular, our submission focuses on clarifying the obligations of States parties to UNCLOS and the Convention on Biological Diversity at the ocean-climate nexus, taking into account also relevant international human rights law obligations. We focus on the extent to which a mutually supportive interpretation of existing international law can contribute to the protection of the marine environment, with particular attention to preventing loss and degradation of marine biodiversity and ecosystem services, as well preventing negative impacts on the human rights of ocean-dependent communities and everyone's human right to a healthy environment.[5]

5. We will first review the scientific understanding of the ocean-climate nexus. We will then briefly recall the scholarly consensus on the relevance of UNCLOS obligations on marine pollution and the protection of the marine environment at the ocean-climate nexus, and the innovations of the BBNJ Agreement. We will then reflect on the relevance of the Convention on Biological Diversity and the decisions adopted by consensus by its 196 Parties for interpreting international obligations to conserve and use sustainably marine biodiversity with a view to contributing to climate change mitigation and adaptation, as well as take a precautionary approach towards climate change response measures that risk having a negative impact on biodiversity and human rights.

III. Ocean-climate science

6. The 'ocean-climate nexus' refers to the key role which the ocean plays in slowing climate change by absorption of excess heat, carbon dioxide (CO_2) and other greenhouse gases from the atmosphere, and regulating the global climate. These processes have provided the international community with more time to mitigate and adapt to climate change. The latent heat of the ocean has absorbed 90% of the warming that has occurred in recent decades due to increasing greenhouse gases, and the top few metres of the ocean store as much heat as the Earth's entire atmosphere.[6] Therefore, were it not for the ocean's role in climate regulation, the global temperature rise limit would be 11.5°C, instead of 1.5°C as aspired under the Paris Agreement. Yet, the crucial role of the ocean, and of marine biodiversity, to achieve the international climate goals is still largely overlooked in international climate discussions.[7]

7. The ocean is both a carbon and heat sink. Central to climate regulation, the ocean sequesters and stores CO2 from the atmosphere.[8] It is noteworthy that it is both the physical ocean as a body of water and its biodiversity that play vital roles in the regulation of the climate. The ocean is a sink for approximately a quarter of anthropogenic CO2, with dissolved organic

[4] Article 31(3)(c) of the Vienna Convention on the Law of Treaties (Vienna, 23 May 1969, in force 27 January 1980, 1155 *UNTS* 331); R Pavoni, 'Mutual Supportiveness as a Principle of Interpretation and Law-Making: A Watershed for the 'WTO-and-Competing-Regimes' Debate?' (2010)21 European Journal of International Law 649.
[5] United Nations General Assembly (UNGA) Resolution 76/300, 'The Human Right to a Clean, Healthy and Sustainable Environment', 1 August 2022, UN Doc A/RES/76/300; and pre-existing treaty bases, the evolving interpretation of which has been summarised in Framework Principles on Human Rights and the Environment: Human Rights Council, 'Report of the Special Rapporteur on the issue of human rights obligations relating to the enjoyment of a safe, clean, healthy and sustainable environment', 24 January 2018, UN Doc A/HRC/37/59.
[6] NASA, Global Climate Change - Vital Signs of the Planet, 'Ocean Warming', available at https://climate.nasa.gov/vital-signs/ocean-warming/.
[7] E Morgera et al, 'Ocean-based Climate Action and Human Rights Implications under the International Climate Change Regime' (2013) 38 International Journal of Marine and Coastal Law (forth).
[8] A R Thurber et al, 'Ecosystem Function and Services Provided by the Deep Sea' (2014) 11(14) Biogeosciences 3941–3963.

carbon equating to approximately 200 times that of marine biomass,[9] and phytoplankton responsible for approximately 50 percent of global primary production.[10] The biophysical process for this involves atmospheric CO2 dissolving across the sea surface water, a process driven by a concentration differentiation, so as atmospheric concentrations increase more CO2 passes into the ocean. This concentration gradient is maintained by the removal of CO2 from the surface by physical means (e.g., mixing and downwelling) and, crucially, by phytoplankton, the foundation of the 'biological carbon pump'. Through photosynthesis, phytoplankton fix dissolved CO2 and export it to deeper water as they decompose and sink or are consumed by herbivorous zooplankton. The larger zooplankton and their faecal pellets can be re-ingested by other organisms, working their way along the marine food web,[11] and ultimately sink out of the upper layers of the ocean to be broken down by microbes.[12]

8. Carbon storage occurs at all levels within the marine environment, from the seawater itself[13] to the seabed,[14] and across marine ecosystems, with plankton,[15] fish,[16] and marine mammals all playing an important role in sequestering carbon from the atmosphere.[17] Coastal marine environments are of particular importance in this context and are understood as "blue carbon" ecosystems which absorb carbon dioxide (CO2) through photosynthesis and store it in tidal marshes, seagrass beds, and mangroves at a rate up to two times faster and store it for longer periods than forests per unit area, both in the plants themselves but also in the sediments below them.[18] These ecosystems contribute to over 50% of all the blue carbon on Earth, despite covering a tiny fraction (0.2%) of the ocean area.19 This point is important insofar that it is both the physical ocean as a body of water and its biodiversity that play vital roles in the regulation of the climate. The role of blue carbon ecosystems in climate mitigation is a growing area of interest for both researchers and states.[20]

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[9] A Z Worden et al., 'Rethinking the Marine Carbon Cycle: Factoring in the Multifarious Lifestyles of Microbes' (2015) 347(6223) Science 735-746.

[10] D Barnes et al., 'Icebergs, Sea Ice, Blue Carbon and Antarctic Climate Feedbacks' (2018) 376 Philosophical Transactions of the Royal Society A 2017.0176; N Hilmi et al., 'The Role of Blue Carbon in Climate Change Mitigation and Carbon Stock Conservation' (2021) 3 Frontiers in Climate Science 710546.

[11] H W Ducklow et al., 'Upper Ocean Carbon Export and the Biological Pump' (2001) 14(4) Oceanography 50–58.

[12] G J Herndl and T Reinthaler, 'Microbial Control of the Dark End of the Biological Pump' (2013) 6(9) Nature Geoscience 718–724.

[13] Intergovernmental Panel on Climate Change (IPCC), *The Ocean and Cryosphere in a Changing Climate: Special Report of the Intergovernmental Panel on Climate Change* (Cambridge University Press 2022) 19, 450-455.

[14] EL Cavan and SL Hill, 'Commercial Fishery Disturbance of the Global Ocean Biological Carbon Sink' (2022) 28 Global Change Biology 1212.

[15] CL Sabine and others, 'The Oceanic Sink for Anthropogenic CO2' (2004) 305 Science 367.

[16] JE Falciani, M Grigoratou and AJ Pershing, 'Optimizing Fisheries for Blue Carbon Management: Why Size Matters' (2022) 67 Limnology and Oceanography S171; D Bianchi and others, 'Estimating Global Biomass and Biogeochemical Cycling of Marine Fish with and without Fishing' (2021) 7 Science Advances DOI: 10.1126/sciadv.abd7554.

[17] MS Savoca and others, 'Baleen Whale Prey Consumption Based on High-Resolution Foraging Measurements' (2021) 599 Nature 85.

[18] United Nations, *The Second World Ocean Assessment* Volume I (UN, 2021) at 360.

[19] Ibid.

[20] See United Nations General Assembly (UNGA) Res 72/75 (5 December 2017) *Oceans and the law of the sea* UN Doc A/RES/72/73, para. 197; S Lutz, 'Why Protect Ocean Biodiversity', presentation for the webinar series 'Policy Lates' 2021, Royal Society of Biology (2021) available at https://www.youtube.com/watch?v=aZG5butO7CM&t=3s.

9. Climate regulation by the deep seas[21] is linked to nutrient cycling and involves biogeochemical processes that transport organic materials from ocean surface to deeper layers.[22] CO2 and methane in the atmosphere are dissolved in surface waters in the upper ocean and transported to depth through global ocean circulation patterns. In addition, carbon from marine organisms in surface waters sinks and accumulates in the deep sea.[23] Here, some of this carbon is ingested by marine organisms on the seafloor,[24] while some is sequestered or stored in sediments through burrowing and bioturbation.[25] Dissolved organic carbon is nearly equal to atmospheric CO2 and the majority of this is found at depths ~1000 m where this carbon remains out of contact with the atmosphere for thousands of years.26 Researchers have found that although rates of carbon sequestration in deep sediments are much lower than in shallow water habitats such as seagrasses, salt marshes and mangroves, these environments play an important role in storing carbon because they cover such vast areas.[27]

10. In terms of heat sequestration, the ocean is able to take up and retain heat at over 1,000 greater than the atmosphere.[28] The top layer of the ocean holds more heat than the Earth's atmosphere.[29] Of the additional heat created by anthropogenic climate change since 1950, 91% has been absorbed by the ocean.[30] While this latent heat absorption has mitigated some of the worst effects of global climate change, there are limitations to the ocean's carrying capacity to store excess heat from global warming. This is causing a rapid rise in global ocean temperatures, though recent studies using improved methodologies indicate that the ocean is warming faster than previously estimated.[31] The IPCC confirmed that since 1993, the average rate of ocean warming has more than doubled.[32] Furthermore, the IPCC's 6th Assessment report stated that

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[21] Deep seas are both benthic and pelagic systems deeper than 200m, so they overlap in great part with the high seas and the deep-seabed that comprise the ABNJs under LOSC (n 10 below). That said, some areas of the deep sea lie within national jurisdiction (Synchronicity Earth Insight, 'High and Deep Seas', 2018, https://www.synchronicityearth.org/wp-content/uploads/2018/02/Synchronicity-Earth-High-Deep-Seas-Insight.pdf) and deep-seas research does not take into account the superficial layer (epipelagic systems) of the high seas.

[22] KL Smith et al, 'Climate, Carbon Cycling, and Deep-Ocean Ecosystems' (2009) 106 Proceedings of the National Academy of Sciences 19211.

[23] S Beaulieu and K Smith, 'Phytodetritus entering the Benthic Boundary Layer and Aggregated on the Sea Floor in the Abyssal NE Pacific: Macro- and Microscopic Composition' (1998) 45 Deep Sea Research Part II: Topical Studies in Oceanography 781-815.

[24] L Lauerman et al, '234Th and 21Pb Evidence for Rapid Ingestion of Settling Particles by Mobile Epibenthic Megafauna in the Abyssal NE Pacific' (1997) 42 Limnology and Oceanography 589-595.

[25] M Miatta and P Snelgrove, 'Sea Pens as Indicators of Macrofaunal Communities in Deep-sea Sediments: Evidence from the Laurentian Channel Marine Protected Area' (2022) 182 Deep Sea Research Part I: Oceanographic Research Papers 103702.

[26] D Hansell et al, 'Dissolved Organic Matter in the Ocean: a Controversy Stimulates New Insights' (2009) 22 Oceanography 202–211; Hilmi et al (n 10).

[27] T Luisetti et al, 'Quantifying and Valuing Carbon Flows and Stores in Coastal and Shelf Ecosystems in the UK' (2019) 35 Ecosystem Services 67-76; TB Atwood et al, 'Global Patterns in Marine Sediment Carbon Stock' (2020) 7 Frontiers in Marine Science 165.

[28] T Stocker et al (eds), 'Climate Change 2013: The Physical Science Basis: Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change', IPCC, 2013 (Cambridge University Press, Cambridge, 2013), at 260-263, available at https://www.ipcc.ch/report/ar5/wg1/.

[29] NASA (n 6).

[30] IPCC, Climate Change 2013: The Physical Science Basis (n 40) at p. 260; See also B Fox-Kemper, HT Hewitt and C Xiao, 'Ocean, Cryosphere and Sea Level Change' in V Masson-Delmotte et al (eds), *Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change* (Cambridge University Press, Cambridge, 2021) 1211-1361, at p. 1228.

[31] L Cheng et al., 'How Fast Are the Oceans Warming?' (2019) 363(6423) Science 128-129.

[32] Intergovernmental Panel on Climate Change (IPCC), *The Ocean and Cryosphere in a Changing Climate: Special Report of the Intergovernmental Panel on Climate Change* (Cambridge University Press 2022) 447 (IPCC, SROCC Report), at p. 8.

'[a]t the ocean's surface, temperature has, on average, increased by 0.88[0.68 to 1.01]°C between 1850–1990 and 2011–2020, with 0.60[0.44 to 0.74]°C of this warming having occurred since 1980'.[33]

11. As for the deep-sea, the IPCC has reported that temperatures have warmed significantly since the 1980s.[34] Carbon stored in the deep ocean in bottom waters, or sediments is considered to be removed from the atmosphere for millions of years.[35] The IPCC reports provide estimates of carbon sequestered that range from 0.4-1.6 gigatonnes of carbon per year,[36] with the annual burial rate (permanent removal to sediment) around 0.2 gigatonnes per year.[37] That said, the IPCC Special Report on the Ocean and Cryosphere in a Changing Climate acknowledged that insufficient scientific understanding on the deep sea limits the assessment of climate change risks.[38] Other gaps include linkages between organisms to communities of organisms and knowledge of climate feedbacks in biological systems.[39] The deep sea is heterogenous and with a range of environmental characteristics that support a variety of ecosystems.[40] This heterogeneity is driven by reliance on photo- vs. chemosynthesis, topographic variation (e.g. canyons, slopes, ridges, seamounts), oligo- vs. eutrophic settings, varied water masses and interactions with the epipelagic and mesopelagic realms.[41] Notably, most of the information on faunal response to climate change in the deep sea is derived from paleo records, natural gradients, a few limited laboratory experiments (e.g., cold water corals) and basic biological knowledge of how living systems cope with altered temperatures.[42] Projected consequences of warming,[43] less oxygen,[44] and more acidic deep oceans, include species and productivity redistributions,[45] habitat compression, biodiversity loss and changes in body size, food webs and connectivity that can influence commercial harvest, carbon sequestration and nutrient cycling.[46] Climatic changes will also negatively affect food supply, essentially particulate organic matter, to the deep seafloor.[47] Understanding how climate change will influence important physical drivers of benthic carbon cycling (e.g. substrate type, seabed geomorphology, benthic boundary layer conditions), ecosystem functions and derived ecosystem services remain understudied. As a result, predicted changes remain largely unresolved.

[33] IPCC, Climate Change 2021: The Physical Science Basis (n 42) at p. 1228.
[34] IPCC, SROCC Report (n 32), at 463.
[35] Ducklow et al. (n 38).
[36] A D Rogers, 'Environmental Change in the Deep Ocean' (2015) 40(1) Annual Review of Environment and Resources 1-38; C W Armstrong et al., 'Ecosystem Goods and Services of the Deep Sea' (2010) Deliverable D6, Universititet i Tromsø, Tromsø, 68 pp. https://www.pik-potsdam.de/news/public-events/archiv/
[37] *Ibid*. (Armstrong et al).
[38] LA Levin, 'IPCC and the Deep Sea: A Case for Deeper Knowledge' (2021) 3 Frontiers in Climate 720755.
[39] IPCC, SROCC Report (n 32)
[40] E Ramirez-Llodra et al., 'Deep, Diverse and Definitely Different: Unique Attributes of the World's Largest Ecosystem' (2010), 7(9) Biogeosciences 2851–2899; M Baker et al., *Natural Capital and Exploitation of the Deep Ocean* (Oxford University Press, 2020).
[41] *Ibid* (Ramirez-Llodra et al).
[42] Levin (n 38).
[43] DG Desbruyères et al., 'Deep and Abyssal Ocean Warming from 35 Years of Repeat Hydrography' 43(19) Geophysical Research Letters 10356-10365.
[44] D Breitburg et al., 'Declining Oxygen in the Global Ocean and Coastal Waters' (2018) 359(6371) Science 7240.
[45] Perez et al., 2018
[46] A K Sweetman et al., 'Major Impacts of Climate Change on Deep-Sea Benthic Ecosystems' (2017) 5(4) *Elementa: Science of the Anthropocene* 1–23; Brito-Morales et al., 'Climate Velocity Reveals Increasing Exposure of Deep-ocean Biodiversity to Future Warming' (2020) 10(6) Nature Climate Change 576–581; L A Levin et al., 'Climate Change Considerations Are Fundamental to Management of Deep-Sea Resource Extraction' (2020) 26(9) Global Change Biology 4664–78; see also Levin (n 38).
[47] Sweetman et al (ibid); Levin et al (ibid).

However, dismissing the heterogeneity of deep-sea ecosystems in climate change scenarios could have unprecedented and potentially irreversible outcomes.

12. Among the many benefits to human wellbeing, the ocean plays a fundamental role in climate regulation, but the ocean-climate nexus acts as a negative feedback loop, whereby climate change progression, moderated by carbon uptake by the ocean, compromises the ocean's continued ability to regulate global climate.[48] The role of the ocean in climate regulation and the global carbon cycle is the product of complex interactions among and between biological and abiotic components operating at a range of temporal and spatial scales. These components and the resilience imparted by their complexity and diversity mean that there is a buffer or lag in an ecosystem's ability to withstand degradation and subsequent reduction in ecosystem service provision.[49]

13. Climate change has increasingly negative impacts on the ocean, which is warming, rising, and acidifying.[50] In addition, there is an increase in the frequency and intensity of extreme weather events as well as marine heatwaves, which are predicted to further increase into the future, causing a plethora of biological and socio-economic impacts.[51] The rates of biodiversity loss in marine ecosystems are less well-understood, but are documented as accelerating due to the compounding impacts of climate change, exploitation of marine resources, sea-use change, pollution (including pollution by plastics) and invasive alien species, with around 66% of the ocean area being under the effect of one or all of these drivers of biodiversity loss.

14. Climate change-induced negative impacts on the ocean and marine biodiversity have knock-on effects on marine ecosystem services. The IPCC has clarified that the ecosystem services the ocean provides span the coast to the deep sea.[52] In addition to climate regulation "services provided to people by the ocean [...] include food and water supply, renewable energy, and benefits for health and well-being, cultural values, tourism, trade, and transport."[53] Marine ecosystem services are therefore foundational for satisfying the material conditions for our human rights: while the IPCC does not state this explicitly, it can be assumed from the increasing recognition of the inter-dependence of ecosystem services and human rights.[54] Marine ecosystem services are not yet fully understood, but there is sufficient knowledge to avoid "foreseeable negative impacts on human rights"[55] that can arise from decisions that may negatively affect biodiversity. Integration of knowledge on marine ecosystem services into decision-making across different policy areas, however, remains limited in comparison to the benefits provided to

[48] R Holst, 'Law in Context: Change in Practice' in R Holst (ed), *Change in the Law of the Sea* (Brill Nijhoff, Leiden, 2022) 247-308.
[49] B Worm, 'Impacts of Biodiversity Loss on Ocean Ecosystem Services' (2006) 314 Science 787; GM Mace, 'Approaches to Defining a Planetary Boundary for Biodiversity' (2014) 28 Global Environmental Change 289.
[50] IPCC SROCC Report (n 32), available at: https://www.ipcc.ch/srocc/; see also United Nations Climate Change, 'Ocean Action under the UNFCCC' available at https://unfccc.int/topics/ocean/ocean-action-under-the-unfccc.
[51] KE Smith et al., 'Biological Impacts of Marine Heatwaves' (2023) 15 Annual Reviews in Marine Science, 119–145.
[52] Deep seas are both benthic and pelagic systems deeper than 200m, so they overlap in great part with the high seas and the deep-seabed that comprise the ABNJs under LOSC (n 10 below). That said, some areas of the deep sea lie within national jurisdiction (Synchronicity Earth Insight, 'High and Deep Seas', 2018, https://www.synchronicityearth.org/wp-content/uploads/2018/02/Synchronicity-Earth-High-Deep-Seas-Insight.pdf) and deep-seas research does not take into account the superficial layer (epipelagic systems) of the high seas.
[53] IPCC, SROCC Report, Summary for Policy Makers (n 32) at p. 5.
[54] J Knox, 'Report of the Special Rapporteur on the Issue of Human Rights Obligations Relating to the Enjoyment of a Safe, Clean, Healthy and Sustainable Environment' UN Doc A/HRC/34/49 (19 January 2017, paras. 5-25.
[55] *Ibid* at para. 34.

terrestrial ecosystems,[56] because of the uncertainty related to the environmental conditions of pelagic and deep-sea ecosystems.

15. Deep-sea ecosystems also present novel and unique opportunities that are still being discovered,[57] including new ecosystems, genetic resources, and unique ecological processes and functions that may contribute to climate change mitigation.[58] Whilst the evidence linking deep-sea living and non-living components, the services they provide and associated benefits lags behind the development of similar ecosystem service frameworks for terrestrial and coastal ecosystems, we know that these ecosystems are of major global importance and progress in this regard is underway.

IV. The protection of marine biodiversity under UNCLOS at the ocean-climate nexus

16. Climate change has been increasingly discussed under the law of the sea.[59] UNCLOS, as a product of its time, does not mention climate change, but its vast scope and demonstrable capacity to adapt to new challenges as an evolutionary instrument, allow[60] it to address climate change within its existing environmental provisions.[61] The positive obligation to protect and preserve the marine environment requires states to take measures to prevent, reduce and control atmospheric pollution, and to take all measures necessary to 'ensure that activities under their jurisdiction or control are so conducted as not to cause damage by pollution to other States and their environment'.[62] The definition of pollution under UNCLOS is broadly drafted, and the general consensus in the international legal literature is that this obligation includes measures for the reduction of emission of GHGs into the atmosphere.[63] The academic consensus is that the definition of pollution under UNCLOS includes GHG emissions and the negative effects of climate change and that obligations under Part XII and other applicable parts of the convention take effect.

17. The scope and content of the general obligation to protect and preserve the marine environment was illustrated in the *South China Sea* arbitration to be 'informed by other provisions of Part XII and other applicable rules of international law'[64] and that any breach of

[56] C Liquete et al., 'Current Status and Future Prospects for the Assessment of Marine and Coastal Ecosystem Services: A Systematic Review' (2013) 8(7) PLos One e67737.
[57] See for example R Blasiak et al (n 30); R Harbour et al, 'Benthic and Demersal Scavenger Biodiversity in the Eastern End of the Clarion-Clipperton Zone – An Area Marked for Polymetallic Nodule Mining' (2020) 7 *Frontiers in Marine Science* 458.
[58] Deep-Ocean Stewardship Initiative (DOSI) 'The Full Value of Marine Genetic Resources (MGR)', DOSI Policy Brief, (2018), available at https://www.dosi-project.org/wp-content/uploads/2018/05/027-DOSI-MGR-1.pdf.
[59] B E Klerk, 'Protecting the Marine Environment from the Impacts of Climate Change: A Regime Interaction Study' (2023) 32 Review of European, Comparative & International Environmental Law 44.
[60] Jill Barrett, 'The UN Convention on the Law of the Sea: A "Living" Treaty?', in J Barrett and R Barnes (eds), *Law of the Sea: UNCLOS as a Living Treaty* (British Institute of International and Comparative Law (BIICL, 2016) 1
[61] UNCLOS Part XII.
[62] UNCLOS, Art. 194(1–2).
[63] A Boyle, 'Climate change, Ocean Governance and UNCLOS' in JM Barrett and R Barnes (eds), *Law of the Sea: UNCLOS as a Living Treaty* (The British Institute of International and Comparative Law 2016) 211, 215; J Harrison, *Saving the Oceans Through Law* (Oxford University Press, 2017) 247–274; MA Orellana, 'Climate Change and the International Law of the Sea' in RS Abate and R Kundis Craig (ed), *Climate Change Impacts on Ocean and Coastal Law* (Oxford University Press 2015); A Boyle, 'Law of the Sea Perspectives on Climate Change' (2012) 27 The International Journal of Marine and Coastal Law 831.
[64] *The South China Sea Arbitration (The Republic of The Philippines v. The People's Republic of China)* Award of 12 July 2016, PCA Case No. 2013-19, ICGJ 49 (*South China Sea Arbitration*), paras. 945-6.

'generally accepted international regulations' is a breach of UNCLOS.[65] This, read in conjunction with UNCLOS Article 212 concerning pollution of the oceans from or through the atmosphere,[66] brings the UNFCCC, the Kyoto Protocol, and the '2015 Paris Agreement within the scope of Part XII',[67] meaning that non-compliance with international climate law obligations on mitigation would constitute non-compliance with UNCLOS obligations on marine pollution from the atmosphere.[68] With that line of argument, Redgwell notes that UNCLOS is important in supplementing the climate regime 'not least because States Parties to UNCLOS are under a legal obligation to prevent, control and reduce sources of marine pollution, including from the atmosphere, regardless of whether they are also party to the climate regime instruments.'[69]

18. The 2023 Agreement on the Conservation and Sustainable Use of Marine Biological Diversity of Areas Beyond National Jurisdiction (BBNJ Agreement)[70] includes several references to climate change. In its preamble, it recognizes 'the need to address, in a coherent and cooperative manner, biodiversity loss and degradation of ecosystems of the ocean, due to, in particular, climate change impacts on marine ecosystems, such as warming and ocean deoxygenation, as well as ocean acidification, pollution, including plastic pollution, and unsustainable use.'[71] In addition, the BBNJ Agreement includes among its general principles, reference to "An approach that builds ecosystems resilience, including to adverse effects of climate change and ocean acidification, and also maintains and restores ecosystem integrity, including the carbon cycling services that underpin the ocean's role in climate.'[72]

19. The definition of 'cumulative impacts' in the BBNJ Agreement, for the purposes of environmental impact assessments, includes 'the combined and incremental impacts resulting from different activities, including known past and present and reasonably foreseeable activities, or from the repetition of similar activities over time, and the consequences of climate change, ocean acidification and related impacts.'[73] One way of informing decision-making in this regard is using appropriately designed, purpose-fit ecosystem models of historic periods to understand observed ecosystem dynamics and responses to past changes in ocean use and altered climatic conditions, and to examine cumulative impacts of multiple drivers on ecosystems.[74] These kinds of models can then be run in simulation mode to explore possible future ecosystem dynamics and elicit potential societal implications under projected climate scenarios or shared socio-economic pathways.[75] It is imperative that uncertainties surrounding possible trajectories and interactions of multiple drivers are acknowledged through considering projections across different types of

[65] *Ibid,* para. 1083; UNCLOS Art. 207.
[66] UNCLOS, Art. 212.
[67] Boyle 'Climate change, Ocean Governance (n 63) 215.
[68] UNCLOS Article 212.
[69] C Redgwell, 'Treaty Evolution, Adaptation and Change: Is the LOSC "Enough" to Address Climate Change Impacts on the Marine Environment?' (2019) 34 The International Journal of Marine and Coastal Law 440, at 449.
[70] Agreement on the Conservation and Sustainable Use of Marine Biological Diversity of Areas Beyond National Jurisdiction (BBNJ Agreement). At the time of writing, the BBNJ Agreement has not yet been formally adopted. All references to BBNJ Agreement provisions in the present work refer to the advanced unedited draft published in early March 2023. See E Morgera et al, 'Addressing the Ocean-Climate Nexus in the BBNJ Agreement: Strategic Environmental Assessments, Human Rights and Equity in Ocean Science" (2013) 38 International Journal of Marine and Coastal Law (forth).
[71] Paragraph 3 BBNJ preamble.
[72] Article 5(g) BBNJ.
[73] Article 14(c) BBNJ (emphasis added).
[74] L Shannon et al, 'Exploring Temporal Variability in the Southern Benguela Ecosystem over the Past Four Decades using a Time-dynamic Ecosystem Model' (2020) 7 Frontiers in Marine Science 540; K Ortega-Cisneros et al, 'Supporting Marine Spatial Planning with an Ecosystem Model of Algoa Bay, South Africa' (2022) 44 African Journal of Marine Science 189-204.
[75] D Tittensor et al, 'Next-generation Ensemble Projections Reveal Higher Climate Risks for Marine Ecosystems' (2021) 11 Nature Climate Change 973-981.

ecosystem models that describe different ecosystem processes and that are based upon different sets of model assumptions. A key challenge in developing these kinds of ecosystem models to inform decision-making in ABNJ is the limited knowledge of how ecological functional groups and thus ecosystem structure and functioning are likely to respond physiologically and behaviourally to altered environmental conditions due to climate change. In that connection, the BBNJ Agreement includes among the types of capacity building and technology transfer, reference to building knowledge of '[s]tressors on the ocean that affect marine biological diversity of areas beyond national jurisdiction, including the adverse effects of climate change such as warming and deoxygenation, as well as ocean acidification.'[76]

20. The BBNJ Agreement provisions on strategic environmental assessments are also notable for present purposes. SEA process within the BBNJ Agreement could ensure sustainability of ocean ecosystems in ABNJ, by transforming the approach conservation and sustainable use from the reactive one which often underpins the use of EIAs, to a more proactive one.[77] In effect, the BBNJ Agreement includes as an objective to

> "Build and strengthen the capacity of Parties, particularly developing States Parties, in particular the least developed countries, landlocked developing countries, geographically disadvantaged States, small island developing States, coastal African States, archipelagic States and developing middle income countries, to prepare, conduct and evaluate environmental impact assessments and strategic environmental assessments in support of the objectives of this Agreement.'[78]

21. The BBNJ Agreement then establishes an obligation for Parties, individually or through international cooperation, to '*consider conducting* [SEAs] for plans and programmes relating to activities under their jurisdiction or control, to be conducted in ABNJ, to assess the potential effects of that plan or programme, as well as alternatives, on the marine environment.'[79] While this obligation does not go as far as requiring States to conduct SEAs, it arguably requires States to assess the need for SEA and discuss such need with domestic actors, as well as with other states bilaterally or mini-laterally,[80] and/or within relevant regional and global bodies. The obligation could also be interpreted to extend to having to articulate reasons for not conducting such assessments when domestic actors or other States may instead recommend one. Arguably, it is possible to identify instances in which a State has not complied with this obligation, and where States should be held accountable. This includes if States do not respond at all or provide no reasoning for refusing to consider suggestions from civil society, intergovernmental organisations or other States pointing to the need for such assessments.[81]

22. In addition, a significant innovation of the BBNJ Agreement is allocating a power to the BBNJ Conference of the Parties (CoP) to 'conduct [SEAs] of an area or *region* to *collate and synthesize the best available information about the area or region, assess current and potential*

[76] Paragraph IV, Annex II BBNJ (emphasis added).
[77] K Hassanali and R Mahon, 'Encouraging Proactive Governance of Marine Biological Diversity of Areas Beyond National Jurisdiction through Strategic Environmental Assessment (SEA)' (2022) 136 Marine Policy 104932.
[78] Article 21(f) BBNJ.
[79] Article 41ter(1) BBNJ (emphasis added).
[80] Consider, for instance, opportunities for international collaboration on this as part of bilateral or minilateral development cooperation agreements, or trade and investment agreements that contain environmental protection and sustainable development clauses. For a general background, see G Marin Duran and E Morgera, *Environmental Integration in the EU's External Relations: Beyond Multilateral Dimensions* (Hart, 2012); and S Jinnah and E Morgera, 'Environmental Provisions in American and EU Free Trade Agreements: A Preliminary Comparison and Research Agenda' (2013) 22 *Review of European Community and International Environmental Law* 324-339.
[81] Morgera et al (n 70).

future impacts and identify data gaps and research priorities.'[82] This is notable for two reasons. First, it creates a multilateral avenue for taking action on SEAs, when individual States may not be willing or able individually to do so. In that connection, the possibility of decisions by voting under the CoP provides an opportunity to go ahead with an SEA against the will of certain States.[83] Second, it seems to respond to a recommendation made by the research community that "regional environmental assessments", as part of SEAs, are necessary to fill knowledge gaps to ensure ecologically meaningful management of BBNJ.[84]

23. All these provisions are notable for introducing the concept of SEAs into the law of the sea, which is required under the Convention on Biodiversity (CBD) in terms of "introdu[ing] appropriate arrangements to ensure that the environmental consequences of [each Party's] programmes and policies that are likely to have significant adverse impacts on biological diversity are duly taken into account".[85] Consensus-based guidance from the CBD-process on SEAs in the marine context include stakeholder engagement and transparency, technical assessment, information-sharing, and monitoring and evaluation after the policy or plan has been adopted.[86] This terminology should be interpreted in accordance with international human rights standards,[87] such as procedural ones on 'information, participation and remedy'[88] and the substantive standard to prevent 'unjustified, foreseeable infringements of human rights' that could arise from any decisions on biodiversity.[89] These clarifications have been developed in the context of the international human right to a healthy environment, with particular attention to biodiversity, thereby shedding light on State's minimum conduct that are often unaddressed in international biodiversity law.[90] These developments are now reflected in the 2022 Global Biodiversity Framework, which aims to inspire all action, including international and regional cooperation, on biodiversity for the next decade.[91]

24. To support synergies with other international regimes, the BBNJ Agreement includes several provisions specifically on regime interaction,[92] as well as an obligation for its parties to cooperate across different fora.[93]

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[82] Article 41ter(2) BBNJ.
[83] Article 48(4) BBNJ.
[84] K McQuaid et al, 'The Need for Strategic Environmental Assessments and Regional Environmental Assessment in ABNJ for Ecologically Meaningful Management', One Ocean Hub Policy Brief (2022), available at https://oneoceanhub.org/publications/policy-brief-the-need-for-strategic-environmental-assestements-and-regional-environmental-assessment-in-abnj-for-ecologically-meaningful-management/.
[85] Article 14(b) CBD: the article qualifies this obligation with "as far as possible and as appropriate", which can be interpreted as a reference to different capacities of CBD Parties and their dependence on scientific, financial and technological cooperation with developed countries: CBD arts. 18 and 20. See E Morgera, (2020), "Biodiversity as a Human Right and its Implications for the EU's External Action", Report to the European Parliament, available at https://www.europarl.europa.eu/RegData/etudes/STUD/2020/603491/EXPO_STU(2020)603491_EN.pdf
[86] CBD, 'Marine and Coastal Biodiversity: Revised Voluntary Guidelines for the Consideration of Biodiversity in Environmental Impact Assessments and Strategic Environmental Assessments in Marine and Coastal Areas' UN Doc UNEP/CBD/COP/11/23 (21 August 2012) Annex, Part II, para 14.
[87] See, albeit with specific focus on the deep-seabed, E Morgera and H Lily, 'Public Participation at the International Seabed Authority – an International Human Rights Analysis' (2022) 31(3) *Review of European, Comparative & International Environmental Law* 374-388.
[88] Report of the Special Rapporteur on the issue of human rights obligations relating to the enjoyment of a safe, clean, healthy and sustainable environment, UN Doc A/HRC/37/59 (2018), Principle 11, para 33(a), making reference also to Framework Principles 4–10.
[89] Knox (n 54) at para. 34.
[90] E Morgera, 'Dawn of a New Day? The Evolving Relationship between the Convention on Biological Diversity and International Human Rights Law' (2018) 54 Wake Forest Law Review 691-712.
[91] CBD Decision 15/4 (2022).
[92] BBNJ Agreement, Art 14(b), 18(2)(b), 20ante (a), 23(2), and 44(4).
[93] BBNJ Agreement, art 6(2) and 43(1).

V. The protection of marine biodiversity under the CBD at the ocean-climate nexus

25. According to UNCLOS Art. 194(5), measures to prevent, reduce control and marine pollution include those necessary to protect and preserve rare or fragile ecosystems as well as the habitat of depleted, threatened or endangered species and other forms of marine life. As mentioned above, the scope and content of the general obligation to protect and preserve the marine environment is to be 'informed by other provisions of UNCLOS Part XII and other applicable rules of international law'[94] and that any breach of 'generally accepted international regulations' is a breach of UNCLOS.[95] The obligations contained in the Convention on Biological Diversity (CBD) and the guidance on the ocean-climate nexus adopted by consensus by 196 CBD Parties should be considered as such generally accepted international regulations for the purposes of interpreting UNCLOS Article 192 and 194(5) with regard to the ocean-climate nexus.

26. The 196 CBD Parties have underscored that biodiversity and ecosystem functions and services significantly contribute to climate change adaptation and mitigation (and more recently have also stressed linkages with disaster risk reduction).[96] On the other hand, they have recognised climate change as one of the four drivers of global biodiversity loss,[97] according to the 2010 Global Biodiversity Outlook, which indicated that the linked challenges of biodiversity loss and climate change must be addressed with equal priority and in close coordination, if "tipping points in biodiversity loss" are to be avoided.[98] This scientific assessment has been reinforced by the 2019 Global Assessment of Biodiversity and Ecosystems Services, which underscored that climate change is not only in and of itself a driver of biodiversity loss, but it also increasingly exacerbates the impact of other drivers with the result that that the rate of global biodiversity degradation during the past 50 years is unprecedented in human history.[99] As a result, current negative trends in biodiversity and ecosystems will undermine progress towards 80% of the assessed targets of the Sustainable Development Goals (SDGs), including those relating to climate change.[100]

27. Thus, while the CBD does not explicitly mention climate change, several of its provisions are relevant to address climate change as a driver of biodiversity loss, as well as to ensuring consistency between international biodiversity and climate change law with regard to climate change response measures.[101] In terms of action at the national and subnational level, the CBD can be interpreted as calling on parties to integrate biodiversity issues into climate change

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[94] *The South China Sea Arbitration (The Republic of The Philippines v. The People's Republic of China)* Award of 12 July 2016, PCA Case No. 2013-19, ICGJ 49 (*South China Sea Arbitration*), paras. 945-6.
[95] *Ibid,* para. 1083; UNCLOS Art. 207.
[96] Dec XIV/5 (2018), preamble.
[97] CBD and UNEP-WCMC, Global Biodiversity Outlook 3, at 22 (2010), available online at: http://gbo3.cbd.int/.
[98] Ibid, at 11 (emphasis added) and 75. More recently, see Biodiversity and climate change: integrated science for coherent policy, CBD/COP/14/INF/22 (2018)
[99] S. Díaz et al (eds). Summary for policymakers of the global assessment report on biodiversity and ecosystem services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES, 2019).
[100] Ibid.
[101] E Morgera, G Hamley and M Lennan, 'Climate Change and Biodiversity' in in Fred Perron-Welch, Jorge Cabrera Medaglia and Alex Goodman (eds), *Legal Aspects of Implementing the Convention on Biological Diversity* (CUP, 2023 forth); available on www.ssrn.com; and E Morgera and M Lennan, 'Ensuring Mutual Supportiveness of the Paris Agreement with other Multilateral Environmental Agreements: A Focus on Ocean-Based Climate Action' in A. Zahar (ed), *Research Handbook on the Law of the Paris Agreement* (Edward Elgar, 2023 forth); available on www.ssrn.com.

plans, programmes, and policies;[102] undertake environmental impact assessments of adaptation and mitigation projects that are likely to have significant adverse effects on biodiversity;[103] regulate climate change-related processes and activities that have a significant adverse effect on biodiversity;[104] avoid or minimize adverse impacts from the use of biological resources for adaptation or mitigation purposes;[105] prevent the introduction of invasive alien species in the context of adaptation and mitigation measures;[106] bring about cooperation between national authorities and the private sector in ensuring the sustainable use of biodiversity for adaptation or mitigation purposes;[107] and provide incentives for the conservation and sustainable use of biodiversity components in the context of adaptation and mitigation activities.[108] Furthermore, the CBD can be interpreted as calling on parties to respect and preserve the traditional knowledge and practices of Indigenous peoples and local communities when implementing mitigation and adaptation measures, as well as ensuring their genuine participation in climate change-related decision-making and rewarding them for their intellectual contribution to mitigation and adaptation measures.[109]

28. Over time, a series of CBD decisions have been adopted on the ocean-climate nexus on the basis of CBD ecosystem approach and precautionary approach[110] to support climate change mitigation and adaptation.[111] The ecosystem approach, as elaborated under the CBD, entails a management process aimed at integrating management of land, water and living resources, and promoting conservation and sustainable use in an equitable manner and through an adaptive approach. It requires adaptive management[112]—responding to changing circumstances and new knowledge, as well as generating new knowledge and reducing uncertainties, thereby allowing management to anticipate and cater for change as a result of the learning process inherent in the ecosystem approach.[113] In addition, under the CBD, the

[102] CBD Art. 6(b) reads: 'Each Contracting Party shall, in accordance with its particular conditions and capabilities:… Integrate, as far as possible and as appropriate, the conservation and sustainable use of biological diversity into relevant sectoral or cross-sectoral plans, programmes and policies.'
[103] CBD art. 14(1)(a) reads: 'Each Contracting Party, as far as possible and as appropriate, shall:… Introduce appropriate procedures requiring environmental impact assessment of its proposed projects that are likely to have significant adverse effects on biological diversity with a view to avoiding or minimizing such effects and, where appropriate, allow for public participation in such procedures.'
[104] CBD art. 8(l) reads: 'Each Contracting Party shall, as far as possible and as appropriate: …Where a significant adverse effect on biological diversity has been determined pursuant to Article 7 [titled Identification and Monitoring], regulate or manage the relevant processes and categories of activities.'
[105] CBD Art. 10(b) reads: 'Each Contracting Party shall, as far as possible and as appropriate:…Adopt measures relating to the use of biological resources to avoid or minimize adverse impacts on biological diversity.'
[106] CBD art. 8(h) reads: 'Each Contracting Party shall, as far as possible and as appropriate: … Prevent the introduction of, control or eradicate those alien species which threaten ecosystems, habitats or species;'
[107] CBD Art. 10(e) reads: 'Each Contracting Party shall, as far as possible and as appropriate:… Encourage cooperation between its governmental authorities and its private sector in developing methods for sustainable use of biological resources.'
[108] CBD art. 11 reads: 'Each Contracting Party shall, as far as possible and as appropriate, adopt economically and socially sound measures that act as incentives for the conservation and sustainable use of components of biological diversity.'
[109] CBD art. 8(j) reads: 'Each Contracting Party shall, as far as possible and as appropriate: … Subject to its national legislation, respect, preserve and maintain knowledge, innovations and practices of indigenous and local communities embodying traditional lifestyles relevant for the conservation and sustainable use of biological diversity and promote their wider application with the approval and involvement of the holders of such knowledge, innovations and practices and encourage the equitable sharing of the benefits arising from the utilization of such knowledge, innovations and practices.' For a discussion of the evolution of the interpretation of this provision by CBD parties, see Morgera (n 90).
[110] UNFCCC Art. 3(3); E Morgera, "The Ecosystem Approach and the Precautionary Principle" in E Morgera and J Razzaque (eds) *Encyclopedia of Environmental Law: Biodiversity and Nature Protection Law* (EE, 2017) 70-80.
[111] CBD Dec VII/15 on Biodiversity and Climate Change, Doc. CBD UNEP/CBD/COP/7/21 (2004) at para. 8.
[112] CBD Dec VII/11 *Ecosystem Approach*, Annex I, Principle 6, Implementation Guideline 6.2, CBD (2004).
[113] Ibid., Annotations to the Rationale of Principle 9.

ecosystem approach also entails a social process: different interested communities must be involved through the development of efficient and effective structures and processes for decision-making and management.[114]

29. For this reason, in the context of strategic environmental assessments and environmental impact assessments, CBD Parties are to address the degradation of, loss of, and impacts on biodiversity and, where appropriate, related social, environmental and economic impacts associated with climate change and disasters. In doing so, they must consider the costs of inaction, and the value of acting in a timely manner order to reduce biodiversity loss and other negative impacts. They are further expected to take into consideration the status of biodiversity and its vulnerability to current and future climate change impacts when planning and implementing ecosystem-based approaches to climate change adaptation, mitigation and disaster risk reduction activities. Based on this information, they must minimize and, where possible, avoid activities that may increase the vulnerability and reduce the resilience of biodiversity and ecosystems.[115] They are, in addition, to integrate ecosystem-based approaches when updating their nationally determined contributions, where appropriate, and when pursuing domestic climate action under the Paris Agreement, taking into account the importance of ensuring the integrity and functionality of all ecosystems, including the ocean, and the protection of biodiversity.[116] Along the same lines, CBD parties are called upon to recognize that ecosystems can be managed to limit climate change impacts on biodiversity and support people's resilience, taking into account multiple social, economic, and cultural co-benefits for local communities.[117]

30. Specifically on the interface between protected areas and climate change, CBD parties recommended identifying areas that are important for mitigation and adaptation purposes, through carbon sequestration and maintenance of carbon stocks, while recognizing that biodiversity conservation remains the primary objective; undertaking joint planning of protected-area networks and of mitigation and adaptation measures; and considering climate change adaptation in assessing the management effectiveness of protected areas.[118] The COP also invited parties to integrate protected areas into wider landscapes, seascapes, and sectors, including through the use of connectivity measures and the restoration of degraded habitats and landscapes, in order to address climate change impacts and increase resilience to climate change; enhance scientific knowledge, as well as traditional and indigenous knowledge, to support the development of adaptive-management plans and to improve management effectiveness of protected areas for addressing impacts from climate change on biodiversity; and evaluate and recognize the value and the benefits of comprehensive, effectively managed, and ecologically representative protected area systems in climate change adaptation and mitigation.[119]

31. On coral bleaching, CBD parties urged governments and relevant organizations to consolidate and further strengthen current efforts at the local, national, regional and global levels to manage coral reefs as socio-ecological systems undergoing change due to the interactive effects of multiple stressors, including both global stressors (for example, rising sea temperature, the effects of tropical storms and rising sea levels, as well as ocean acidification) and local stressors (for example, overfishing, destructive fishing practices, land- based and sea-based pollution, coastal development, tourism and recreational use, etc.).[120] Suggested action include: reducing the impacts of multiple stressors, in particular by addressing those stressors that are more tractable at the regional, national and local levels, noting that this would have multiple benefits; enhancing the resilience of coral reefs and closely associated ecosystems through ecosystem-based adaptation to enable the continued provisioning of goods and services;

[114] CBD Dec X/29 (2010), para. 13(h) and Annex, para. d. See,
[115] CBD Dec XIII/4, para 8 (a-b).
[116] CBD Dec XIV/5, para 5 (a-b)
[117] Ibid., para. 8(i).
[118] CBD Dec X/31, supra note 103, paras. 14(d) and (f), and 19(c).
[119] Ibid., para. 14(a)-(c).
[120] CBD Dec XII/23, para 14.

increasing the capability of local and national managers to forecast and plan proactively for climate risks and associated secondary effects, applying ecosystem-based adaptation measures; and integrating ecological and social resilience factors of coral reefs and closely associated ecosystems into the design and management of marine protected area networks.[121]

32. The 2022 Kunming-Montreal Global Biodiversity Framework includes a target to 'minimise the impacts of climate change and ocean acidification on biodiversity and increase its resilience through mitigation, adaptation, and disaster risk reduction actions. This is envisioned through nature-based solutions and/or ecosystem-based approaches, while minimising negative and fostering positive impacts of climate action on biodiversity' by 2030.'[122] The preference for nature-based solutions in the Kunming-Montreal Global Biodiversity Framework can be explained by the concerns raised under the CBD about technology-driven approaches to climate mitigation that cause or threaten to cause negative impacts on biodiversity, such as ocean fertilization and other forms of geoengineering, an exception for scientific research, and the need for further reflection by the international community.[123]

> The COP invited governments, according to national circumstances and priorities,
>
> [to e]nsure, in line with decision IX/16 C on ocean fertilization, in the absence of science based, global, transparent and effective control and regulatory mechanisms for geo-engineering, and in accordance with the precautionary approach and CBD Article 14, that no climate change-related geo-engineering activities that may affect biodiversity take place, until there is an adequate scientific basis on which to justify them and appropriate consideration of the associated risks for the environment and biodiversity and associated social, economic and cultural impacts.[124]

There is one exception is for small-scale scientific research may be conducted in a controlled setting in accordance with CBD Article 3 if it is justified by the need to gather scientific data and is subject to a thorough prior assessment of potential impacts on the environment.

VI. The protection of marine biodiversity at the ocean-climate nexus under international human rights law

33. In 2022, the Committee on Human Rights recognized the negative impacts of climate change on the ocean (sea-level rise and subsidence, coral bleaching, saltwater intrusion and other alterations to marine ecosystems) on which livelihoods and culture depend, including the ability to transmit to children and future generations traditions related to the sea. This is particularly the case when marine resources are essential components of distinctive ways of life and when alternatives to subsistence livelihoods are lacking, such as in small islands. The Committee thus indicated that lack, delay or inadequacy of ocean-based climate change adaptation is considered a violation of human rights when the ability of human rights-holders to cope is compromised, and negative impacts on their human rights are foreseeable, serious and attributable to State authorities.[125]

[121] CBD Dec XII/23, para 14.
[122] CBD Deci XV/4, 'Kunming-Montreal Global Biodiversity Framework', Target 8.
[123] CBD Dec X/33.
[124] Ibid, para. 8(w); reiterated in 2018 (CBD Dec XI/20, para 110).
[125] Views adopted by the Human Rights Committee under article 5 (4) of the Optional Protocol, concerning communication No. 3624/2019, UN Doc CCPR/C/135/D/3624/2019 (2022).

34. The CBD guidance on the ocean-climate nexus has often (implicitly[126]) contributed to define a right-based approach to climate change adaptation and mitigation.[127] For instance, CBD parties committed to assessing the impacts of climate change not only on biodiversity but also on biodiversity-based livelihoods, with a view to identifying adaptation priorities.[128] Particular attention is directed, in this respect, to livelihoods within ecosystems that have been identified as being particularly vulnerable to the negative impacts of climate change.[129] The 2022 Kunming-Montreal Biodiversity Framework, which aims to catalyze, enable and galvanize urgent and transformative action at all levels to halt and reverse biodiversity loss, and was adopted by consensus by the 196 CBD Parties, indicates that the implementation of the Framework 'should follow a human rights-based approach, respecting, protecting, promoting and fulfilling human rights' and acknowledges the human right to a clean, healthy and sustainable environment.[130]

35. The BBNJ Agreement makes both explicit and implicit reference to human rights. Its preamble and one of its general principles refer to respecting, promoting and considering the 'rights of Indigenous Peoples or of, as appropriate, local communities.'[131] In addition, the Agreement contains obligations to conduct environmental impact assessments (EIAs), and a monitoring obligation on economic, social, cultural and human health impacts of any activities in ABNJ which they permit, or in which they engage, in order to determine whether these activities are likely to pollute or have adverse impacts on the marine environment.[132] It also specifically foresees a role for area-based management measures (ABMTs) to support food security and other socioeconomic objectives, including the protection of cultural values.[133] These provisions can support a collective identification of the dire need for progress in ocean science and management, taking into account ecological connectivity between areas within and beyond national jurisdiction, as well as our evolving understanding of the ecosystem services provided by BBNJ that are essential for ocean-dependent human rights-holders.[134] SEAs under the BBNJ Agreement can also involve consideration of broader human rights implications for local coastal communities, including women and children, small-scale fishers, Indigenous and local knowledge holders.[135] All these provisions, as discussed under Section IV, are relevant for the ocean-climate nexus.

36. As the former UN Special Rapporteur on Human Rights and the Environment, John Knox, clarified, States should avoid foreseeable negative impacts on human rights that can arise from decisions that may negatively affect biodiversity and ecosystem services.[136] And

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[126] Morgera (n 90).
[127] Ibid.
[128] CBD Dec X/33, para. 8(b).
[129] Ibid.
[130] CBD XV/4, Annex, para 7(g).
[131] Article 5(j) BBNJ. See also J Knox, 'Report of the Special Rapporteur on the Issue of Human Rights Obligations Relating to the Enjoyment of a Safe, Clean, Healthy and Sustainable Environment: Framework Principles on Human Rights and the Environment', UN Doc A/HRC/37/59 (24 January 2018), Principle 15; and E Morgera, 'Under the Radar: Fair and Equitable Benefit-sharing and the Human Rights of Indigenous Peoples and Local Communities connected to Natural Resources' (2019) 23 *International Journal of Human Rights* 1098-1139, https://doi.org/10.1080/13642987.2019.1592161.
[132] Article 39 BBNJ
[133] Article 14(d) BBNJ.
[134] E Morgera, '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 V De Lucia, L Nguyen and A G. Oude Elferink (eds), *International Law and Marine Areas beyond National Jurisdiction: Reflections on Justice, Space, Knowledge and Power* (Brill, 2022) 242-274 pp 273-274.
[135] Morgera et al (n 70).
[136] Knox (n 54).

this interpretative clarification should be read in the light of the climate-ocean science on marine ecosystem services discussed in Section II above.

VII. Children's human rights at the ocean-climate nexus

37. The effects of climate change and biodiversity loss prevent children from enjoying their human rights today and in the future, as their long-term physical and mental health and overall quality of life.[137] It is now widely understood that climate change will harm the poorest and most vulnerable children first, hardest and longest.[138] Youth representatives at the 2021 Glasgow Climate Summit and at the 2022 UN Ocean Conference shared their concerns about deep-seabed mining and climate change.[139]The interdependence of children's rights and a healthy environment have led the UN Committee on the Rights of the Child to adopt a new General Comment on children's human rights and healthy environment, with a special focus on climate change, to clarify relevant State obligations under the UNCRC.[140] Even before these developments, former UN Special Rapporteur on Human Rights and the Environment John Knox had clarified States' obligations vis-à-vis children's human rights in terms of intergenerational equity.[141] According to the Rapporteur, substantive standards include: considering the best interests of the child as a matter of primary consideration when designing, implementing and monitoring environmental regulation; and establishing and maintaining substantive non-regressive and precautionary environmental standards that contribute to minimize the future negative impacts of climate change on children to the greatest extent possible.[142]

38. Consideration of children's human rights provides important considerations for the application of the precautionary principle and approach: children's human rights to life, survival, health and food call attention to immediate concerns, whereas children's right to development can serve as a basis to assess the long-term effects of marine pollution on children's life and wellbeing at later stages of their lives. Thus, threats of serious or irreversible damage should be considered in relation to 'short, medium and long-term effects of actions related to the development of the child over time', recognizing 'each period of childhood, its unfolding importance for subsequent stages and children's varying needs at different stages of their maturation and development' and the 'wide range of determinants' for children of different ages to develop to the fullest potential as part of this 'life-course perspective'.[143] As a result, the application of precaution in the context of the protection of the marine environment at the ocean-climate nexus should take into account the 'possibility that environmental actions that seem

[137] World Health Organization (WHO), 'Inheriting a Sustainable World? Atlas on Children's Health and the Environment' (WHO 2017).
[138] UNICEF, 'Unless We Act Now: The Impact of Climate Change on Children' (UNICEF 2015). See also HRC 'Analytical Study on the Relationship between Climate Change and the Full and Effective Enjoyment of the Rights of the Child' UN Doc A/HRC/35/13 (4 May 2017).
[139] One Ocean Hub Roundtable on 'Children and Young Peoples' Human Rights to a Healthy Ocean: Their Importance for Climate Change Adaptation and mitigation', Virtual Ocean Pavilion for the Climate Glasgow COP (12 November 2021) <https://www.youtube.com/watch?v=TVoF8hmSpEE&t=414s>; and S Álvarez Peña et al, 'Youths Call for a Deep-Sea Mining Moratorium' (Youth Policy Advisory Council of the Sustainable Ocean Alliance, 22 September 2022).
[140] UN Committee on the Rights of the Child, 'Draft General Comment No. 26 on Children's Rights and the Environment with a Special Focus on Climate Change' <https://www.ohchr.org/en/documents/general-comments-and-recommendations/draft-general-comment-no-26-childrens-rights-and>.
[141] J Knox, 'Report of the Special Rapporteur on the Issue of Human Rights Obligations Relating to the Enjoyment of a Safe, Clean, Healthy and Sustainable Environment' UN Doc A/HRC/37/58 (24 January 2018).
[142] HRC (n138).
[143] A first draft of the General Comment No. 26 was released for public comment on 15th November 2022 and included these indications (n 140, paras II.B.13 and 20). The final version was adopted by the UNCRC in late May 2023. And is expected to be released in July 2023. See S Shields et al, 'Children's Human Right to be Heard at the Ocean-Climate Nexus' (2013 forth) 38 International Journal of Marine and Coastal Law.

reasonable on a shorter scale can become unreasonable when considering the full harm they will cause to children throughout their childhoods and their lives'.[144]

[144] Ibid, para 55.