

Fisheries Redistribution under Climate Change

Rethinking the Law to Address the ‘Governance Gap’?

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12.1 INTRODUCTION

Climate change is altering the ocean through warming, acidification, deoxygenation and other stressors. Taking the troubling state of global fish stocks¹ and the decline in global biodiversity levels² into account, this paints an alarming picture.³ A pervasive yet overlooked issue is the impact of climate change on the distribution of fish stocks and other marine species (marine living resources or MLRs), which causes governance issues and threatens the rule of law for the oceans. For example, when fish move across static jurisdictional and management boundaries, they may become unregulated and risk being overexploited.⁴ Shifting fish stocks threaten the certainty, predictability and stability of the international fisheries legal framework. They also undermine conservation and management measures (CMMs) by coastal States and regional fisheries management organisations or arrangements (RFMO/As), impeding sustainable exploitation and conservation of global fish stocks.⁵

To address these challenges, the legal framework applicable to fisheries and marine biodiversity must be flexible and adaptive in response to redistribution of fish stocks across scales, or risk undermining the rule of law. Since this framework

¹ D. Pauly and D. Zeller, ‘Catch Reconstructions Reveal that Global Marine Fisheries Catches Are Higher than Reported and Declining’ (2016) 7 *Nature Communications* 10244.

² S. Diaz et al. (eds.), *Summary for Policymakers of the Global Assessment Report on Biodiversity and Ecosystem Services for the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services* (Bonn: IPBES, 2019).

³ UN Environment, 2020: A crunch year for the biodiversity and climate emergency, Press Release 23 December 2019 <www.unenvironment.org/news-and-stories/story/2020-crunch-year-biodiversity-and-climate-emergencies>.

⁴ M. Pinsky et al., ‘Preparing Ocean Governance for Species on the Move’ (2018) 360 *Science* 1189–1191.

⁵ IPCC, ‘Summary for Policymakers’ in H.-O. Pörtner et al. (eds.), *IPCC Special Report on the Ocean and Cryosphere in a Changing Climate* (IPCC 2019) 12.

does not directly account for species shifts, it has been argued to constitute a ‘governance gap’ requiring urgent attention.⁶

This chapter assesses whether and to what extent the international legal framework adequately places an obligation on States to adapt to the complexities caused by MLRs shifting their location, in order to ensure legal certainty, stability and predictability and maintain the rule of law. First, it outlines the main issues caused by fisheries redistribution (Section 12.2). Second, it assesses whether the key principles and obligations within the international legal framework are fit for purpose to address these issues (Section 12.3). A systemic interpretation of relevant provisions from the United Nations Convention on the Law of the Sea (UNCLOS),⁷ the Fish Stocks Agreement (UNFSA),⁸ the Convention on Biological Diversity (CBD),⁹ the Convention on Migratory Species (CMS),¹⁰ as well as the international climate law regime,¹¹ indicate a general obligation on States, either individually or through RFMO/As to adapt management and conservation of MLRs to the effects of climate change. Section 12.4 explores potential solutions that might strengthen adaptive responses to fisheries redistribution within this framework, thereby helping to maintain the rule of law.

12.2 FISHERIES REDISTRIBUTION UNDER CLIMATE CHANGE

This section provides a brief overview of the ever-growing body of scientific literature on marine species redistribution under climate change, followed by the jurisdictional and managerial challenges this causes, which constitute the so-called governance gap that the international legal framework must address to maintain the rule of law in response to environmental change.

12.2.1 *Causes and Consequences*

The ocean has been warming faster than previously estimated,¹² and has become more acidic, particularly at higher latitudes.¹³ Extreme marine temperature events

⁶ Pinsky et al. (n 4).

⁷ United Nations Convention on the Law of the Sea (UNCLOS), Montego Bay, 10 December 1982, in force 16 November 1994, 1833 UNTS 3.

⁸ Agreement for the Implementation of the Provisions of the United Nations Convention on the Law of the Sea of 10 December 1982 relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks (UNFSA), New York, 4 August 1995, in force 11 November 2001, 2167 UNTS 3.

⁹ United Nations Convention on Biological Diversity (CBD), Rio de Janeiro, 22 May 1992, in force 29 December 1993, 1760 UNTS 79.

¹⁰ Convention on the Conservation of Migratory Species of Wild Animals (CMS), Bonn, 23 June 1979 in force 1 November 1983, 1651 UNTS 333.

¹¹ United Nations Framework Convention on Climate Change (UNFCCC), New York, 9 May 1992, in force 21 March 1994, 1771 UNTS 107; Paris Agreement, Paris, 12 December 2015, in force 4 November 2016, UN Doc. FCCC/CP.2015/L.9/Rev.1.

¹² É. Plagányi, ‘Climate Change Impacts on Fisheries’ (2019) 363 *Science* 930–931.

¹³ IPCC, ‘Summary for Policymakers’ (n 5) 24.

are also increasing in frequency and duration,¹⁴ as are warming “hotspots” in different regions of the ocean.¹⁵

Generally, the response of marine species to changes in temperature is to shift location poleward, or into deeper waters, towards their preferred environmental conditions.¹⁶ This results in the redistribution of species from their historical locations and across maritime boundaries, causing complications for conservation, management and exploitation of MLRs.¹⁷ Species shifting poleward due to temperature changes may encounter unsuitable acidity and/or oxygen levels, leaving them squeezed between extremes, causing local extinctions or decreases in abundance.¹⁸ Latest estimates suggest that on average, fish and other marine species have shifted into new areas at a rate of 70 kilometres per decade.¹⁹ It has been predicted that 892 MLRs of commercial importance are expected to shift their distribution in the future.²⁰

Complications from these changes in distribution and abundance are numerous. They include species leaving designated conservation areas and thus limiting the efficacy of marine protected areas (MPAs).²¹ Inter- and intra-State conflicts can occur over quota allocations as they move across management jurisdictions²² and into deeper waters.²³ Problems also arise when the distribution of a fish stock becomes less predictable, and ‘are compounded when States act unilaterally to exploit the resultant windfall’.²⁴ Conflicts and breakdowns in cooperation can lead to overexploitation of MLRs and environmental damage, undermining the legal objectives of conservation and sustainable use.²⁵

¹⁴ E. C. J. Oliver et al., ‘Longer and More Frequent Marine Heatwaves over the Past Century’ (2018) 9 *Nature Communications* 1324.

¹⁵ A. Hobday and G. Pecl, ‘Identification of Global Marine Hotspots: Sentinels for Change and Vanguard for Adaptation Action’ (2014) 24 *Reviews in Fish Biology and Fisheries* 415–425.

¹⁶ E. S. Poloczanska et al., ‘Global Imprint of Climate Change on Marine Life’ (2013) 3 *Nature Climate Change* 919–925.

¹⁷ Pinsky et al. (n 4).

¹⁸ W. W. L. Cheung et al., ‘Modelling Future Oceans: The Present and Emerging Future of Fish Stocks and Fisheries’ in R. Caddell and E. Molenaar (eds.), *Strengthening International Fisheries Law in an Era of Changing Oceans* (Oxford: Hart, 2019) 13–23, 15.

¹⁹ Poloczanska et al. (n 16).

²⁰ Pinsky et al. (n 4).

²¹ *Ibid.*

²² A. Østhagen et al., ‘Collapse of Cooperation? The North-Atlantic Mackerel Dispute and Lessons for International Cooperation on Transboundary Fish Stocks’ (2020) 19 *Maritime Studies* 155–165.

²³ J. Spijkers et al., ‘Marine Fisheries and Future Ocean Conflict’ (2018) 19 *Fish and Fisheries* 789–806.

²⁴ Pinsky et al. (n 4) 1189.

²⁵ Østhagen et al. (n 22); Spijkers et al. (n 23).

12.2.2 *The Case for Adaptation*

Marine species shifts and their consequences will persist at current rates or accelerate, depending on levels of future warming.²⁶ The social and ecological benefits of keeping climate warming to a minimum have been outlined extensively.²⁷ Implementation of the 2°C temperature goal in Article 2 of the Paris Agreement (PA) would benefit 75 per cent of coastal States through stabilised or increased catch of MLRs, ~90 per cent of which would occur in developing countries.²⁸ Even if current climate warming targets are met, however, some level of environmental change is guaranteed.²⁹ Adverse changes cannot be prevented by emission reductions alone, and further warming and acidification of the ocean is unavoidable, making adaptation a necessity.³⁰

This considered, the need for international law relating to fisheries and the marine environment to facilitate adaptation to environmental change is necessary to promote resilience to climate change impacts on the oceans and their biodiversity. Though present in the international climate legal regime from the outset, climate adaptation is enshrined in the global goal on adaptation in the PA.³¹ Climate adaptation in anthropogenic systems is considered as ‘the process of adjustment to actual climate and its effects, in order to moderate harm or exploit beneficial opportunities’.³² Fisheries are anthropogenic, social-ecological systems, where management decisions and fishing activities undertaken by humans impact marine ecosystems.³³ Several forms of climate adaptation can take place, that is, ‘planned adaptation’ defined as ‘[a]daptation that is the result of a deliberate policy decision, based on an awareness that conditions have changed or are about to change and that action is required to return to, maintain, or achieve a desired state’.³⁴ This is the definition of adaptation used throughout the rest of the chapter.

²⁶ Cheung et al (n 18).

²⁷ IPCC, *Climate Change 2007: The Synthesis Report: Summary for Policy Makers. Fourth Assessment Report for the Intergovernmental Panel on Climate Change* (Bonn: IPCC Secretariat, 2007).

²⁸ U. R. Sumalia et al., ‘Benefits of the Paris Agreement to Ocean Life, Economies, and People’ (2019) 5 *Science Advances* 3855.

²⁹ IPCC, *Climate Change 2007* (n 27).

³⁰ *Ibid.*, 19; IPCC, ‘Summary for Policymakers’ (n 5), 415.

³¹ Paris Agreement (n 11), Art. 7.

³² C. B. Field et al. (eds.), *Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation: Special Report of the Intergovernmental Panel on Climate Change* (Cambridge: Cambridge University Press, 2007), 556.

³³ C. Folke, ‘Social-Ecological Systems and Adaptive Governance of the Commons’ (2007) 22 *Ecological Research* 14–15; C. Folke et al., ‘Social-Ecological Resilience and Biosphere-Based Sustainability Science’ (2016) 21 *Ecology and Society* 41–57.

³⁴ M. L. Parry et al. (eds.), *Climate Change 2007: Impacts, Adaptation and Vulnerability: Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* (Cambridge: Cambridge University Press, 2007), 869.

Several complications face the conservation, management and exploitation of MLRs, complications that result from shifts in distribution due to climate change. Since the applicable international legal framework does not directly account for these, this has been argued as constituting a gap in law and governance,³⁵ which undermines legal certainty. Climate change causes uncertainty, instability and change in marine social-ecological systems, that is, fisheries, making adaptation a necessity. Conventional legal and governance frameworks aim to provide certainty and stability, and fisheries redistribution challenges this. Climate change pressurises these frameworks by requiring them to adapt to climate impacts (normative adaptation) so that adaptive action can be taken (practical adaptation). The role of law here is to facilitate action to increase resilience and adaptive capacity of social-ecological systems to climate change, in order to maintain stability and the rule of law.³⁶ The next section assesses whether the international legal framework is adequate to facilitate an adaptive response by States to the complexities caused by marine species shifting their location.

12.3 THE INTERNATIONAL LEGAL FRAMEWORK: FIT FOR PURPOSE?

Several international legal instruments constitute the framework governing States' rights and obligations with respect to the use of oceans and their resources, including fisheries and protection of the marine environment. Regional agreements and their commissions, including RFMO/As, play a similar role in regional seas or in areas beyond national jurisdiction (ABNJ), providing finer detail for cooperative management needs specific to a certain region. However, the fact that 'the current legal framework for the international regulation of fisheries does not directly account for fluctuating or changing distributions'³⁷ has been argued to constitute a gap in the law and governance regime applicable to MLRs, risking conflict and overexploitation of species and undermining the rule of the law for the oceans.

Working with the legal instruments already at hand in response to such pressing issues is vital, considering the urgent need to adapt. In assessing whether the international legal framework is fit for purpose, this section outlines its relevant features that could facilitate effective adaptation to marine species redistribution. The framework is presented as key obligations and principles within several multi-lateral instruments. This is done to stress the importance of systemic and evolutive interpretation of the international legal framework to address new challenges to the marine environment, maximise efficiency of existing fragmented legal rules and address and avoid governance gaps, thereby strengthening the rule of law.

³⁵ Pinsky et al. (n 4).

³⁶ R. K. Craig et al., 'Balancing Stability and Flexibility in Adaptive Governance: An Analysis of Tools Available in U.S. Environmental Law' (2017) 22 *Ecology and Society* 3–18.

³⁷ Pinsky et al. (n 4) 1190.

12.3.1 Protection and Preservation of the Marine Environment

Part XII of UNCLOS obliges States to protect and preserve the marine environment. This is a general obligation of conduct, of ‘due diligence’ applying to all maritime areas regardless of jurisdiction.³⁸ This obligation is *erga omnes*, and jurisprudential developments over the past twenty years support a progressive, evolutionary interpretation with the provisions covering, inter alia, MLRs.³⁹ UNCLOS places responsibility for the conservation and management of fish stocks on coastal States within their exclusive economic zones (EEZs),⁴⁰ and adopting CMMs for all MLRs within their EEZ is mandatory and an ‘integral element’ in the protection and preservation of the marine environment.⁴¹ States have an obligation to ensure that MLRs within their jurisdiction are not overexploited.⁴² Through this obligation, there is the possibility that national regulations could contribute to far-sighted sustainable management of fish stocks that move into, or straddle, waters in an adjacent State’s jurisdiction due to climate change.⁴³ Should new fish stocks appear in a coastal State’s EEZ, that State is under a positive obligation to introduce CMMs for those stocks, cooperating with any neighbouring States whose waters that stock may also inhabit. This can include designation of transboundary or regional MPAs. Cooperation is discussed in greater detail later in Section 3.3.

The CBD is a crucial interpretive tool in this context. Parties must read CBD provisions consistently with UNCLOS,⁴⁴ and these provisions inform and strengthen the marine environmental protection obligations in Part XII.⁴⁵ Parties have adopted commitments to increase MPA coverage by 10 per cent by 2020 as one of the Aichi Biodiversity Targets,⁴⁶ as well as other effective area-based conservation measures.⁴⁷ However, while quantitative progress has been made in meeting the 10 per cent target of MPAs, the qualitative aspect, that is, MPAs that are ecologically representative, well connected and equitably managed, has not received adequate

³⁸ *Request for an Advisory Opinion Submitted by the Sub-Regional Fisheries Commission* (Fisheries Advisory Opinion), Advisory Opinion of 2 April 2016, ITLOS Reports (2015), para. 120; *South China Sea Arbitration (Philippines v. China)*, PCA Award of 12 July 2016, para. 940.

³⁹ *Southern Bluefin Tuna (New Zealand v. Japan; Australia v. Japan)*, Provisional Measures Order of 27 August 1999, ITLOS Reports 1999, 280 para. 70; *Chagos Marine Protected Area Arbitration (Mauritius v. United Kingdom)*, Award of 18 March 2015, PCA Case No. 2011-03, paras. 320 and 583; *South China Sea Arbitration* (n 38) para. 945.

⁴⁰ UNCLOS (n 7), Art. 56.

⁴¹ *Southern Bluefin Tuna* (n 39) para. 96; *Fisheries Advisory Opinion* (n 38) para. 120.

⁴² UNCLOS (n 7), Arts. 61.3; 191(1)(a).

⁴³ Pinsky et al. (n 4) 1190.

⁴⁴ CBD (n 9), Arts. 6–10, 22.

⁴⁵ *South China Sea Arbitration* (n 38) para. 908.

⁴⁶ CBD (n 9), Aichi Biodiversity Targets <www.cbd.int/sp/targets/>.

⁴⁷ CBD Decision X/2; Aichi Biodiversity Target 11; CBD (n 9), Art. 8(a) obliges parties to establish a system of protected areas.

attention.⁴⁸ Moving forward, the first draft of the Post-2020 Global Biodiversity Framework proposes to increase protection to 30 per cent and contribute to climate change mitigation and adaptation through ecosystem-based solutions.⁴⁹

Obligations under the CBD relating to conservation and sustainable use of biological diversity apply to fisheries, fishing activities and conservation of marine biodiversity. Parties have indicated the necessity for further implementation and improvement of the ecosystem approach to fisheries (EAF).⁵⁰ Parties have also committed to achieving Aichi Target 6,⁵¹ which outlines that by 2020 all fish and invertebrate stocks are managed and harvested legally and sustainably, applying ecosystem-based approaches, so that overfishing is avoided, recovery plans and measures are in place for all depleted species, fisheries have no significant adverse impacts on stocks and species and ecosystems are within safe ecological limits.⁵²

With this commitment, parties are expected to engage in sustainable management practices framed by the EAF.⁵³ Logically, this should include adaptive management to species redistribution.

Aichi Target 10 commits to minimising additional multiple anthropogenic pressures on vulnerable marine ecosystems already impacted by climate change to maintain their function and integrity.⁵⁴ Implementation of this target can include reduction of overexploitation and harvesting;⁵⁵ for example, in response to arrival of new species, fisheries managers in Tasmania introduced ‘proactive management policies to limit catch of several new species through the introduction of bag limits for recreational fishers, to allow new fish populations to become established’.⁵⁶ While these are helpful components of international legal tools to adapt marine conservation and management to climate change, there are some issues.

⁴⁸ B. Erinoshio et al., ‘Transformative Governance in Ocean Biodiversity’ in I. J. Visseren-Hamakers and M. Kok (eds.), *Transforming Biodiversity Governance* (Cambridge: Cambridge University Press, 2021) <https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3853886>; D. Diz et al., ‘Mainstreaming Marine Biodiversity into the SDGs: The Role of Other Effective Area-Bases Conservation Measures (SDG14.5)’ (2018) 93 *Marine Policy* 251–261; S. Rees et al., ‘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’ (2018) 93 *Marine Policy* 241–250.

⁴⁹ CBD, First Draft of the Post-2020 Global Biodiversity Framework, 5 July 2021, CBD/WG2020/3/3 <www.cbd.int/doc/c/abb5/591f/2e46096d3f0330b08ce87a45/wg2020-03-03-en.pdf>.

⁵⁰ CBD Decision X/2, CBD Decision XI/18, para. 2; CBD Decision XIII/2.

⁵¹ CBD, *Aichi Target 6: Technical Rationale* <www.cbd.int/sp/targets/rationale/target-6/>.

⁵² CBD Decision X/2.

⁵³ *Ibid.*

⁵⁴ CBD, *Aichi Target 10: Technical Rationale* <www.cbd.int/sp/targets/rationale/target-10/>.

⁵⁵ *Ibid.*

⁵⁶ B. R. Scheffers and G. Pecl, ‘Persecuting, Protecting or Ignoring Biodiversity under Climate Change’ (2019) 9 *Nature Climate Change* 581–586, 582.

The CBD places considerable weight on return to historical conditions and in situ conservation, which could potentially be a barrier to successful adaptive management in response to marine species redistribution. Though inexplicit, the CBD definition of in situ⁵⁷ reflects the ecosystem approach (EA),⁵⁸ which parties have committed to applying.⁵⁹ Article 8 provides an exhaustive ‘toolkit of measures to be applied case-by-case to achieve conservation in situ, including inter alia establishing protected areas, rehabilitation of degraded ecosystems and legislation for protection of threatened species.’⁶⁰ The definition of in situ has yet to be addressed by CBD parties, and it is recommended that a shift in objective is needed to account for climate change consequences in the environment.⁶¹ With this in mind, could ‘time-bound’, ‘temporary’ or ‘flexible MPAs be an adaptive response? CBD Article 10 on sustainable use of components of biological diversity supports the notion that MPAs with this characteristic could maintain resilient protection of marine species as they shift location. Since in situ reflects the EA, which, depending on local, regional, national or global conditions, integrates differing legal and management strategies,⁶² it is by nature an adaptive and anticipatory approach.⁶³ This considered, MPAs could either be adaptive in the sense that they are not geographically fixed, and can move in response to shifts in distribution, spread across an interconnected ‘patchwork’ or simply be large enough and spread across management jurisdictions that they can accommodate shifts in marine species.

Like the CBD, another interpretative tool of UNCLOS Part XII is the CMS. The CBD has recognised the CMS as a lead partner in the conservation and sustainable use of migratory species over their entire range.⁶⁴ CMS parties are obliged to take necessary steps to conserve migratory species and their habitats.⁶⁵ Article III(4) of the CMS arguably covers climate adaptation and mitigation measures through the obligation to ‘prevent, reduce or control factors that are endangering or are likely to further endanger’⁶⁶ species listed in Appendix I, which includes several species of

⁵⁷ CBD (n 9), Art. 2

⁵⁸ P. Birnie et al., *International Law and the Environment*, 3rd ed. (Oxford: Oxford University Press, 2009) 639.

⁵⁹ CBD Decisions V/6 & VII/11.

⁶⁰ CBD (n 9), Arts. 8(a), 8(d), 8(f), 8(k).

⁶¹ A. Trouwborst, ‘Climate Change Adaptation and Biodiversity Law’ in J. Verschuuren (ed.) *Research Handbook on Climate Adaptation Law* (Cheltenham: Edward Elgar, 2013) at 298–332; Pinsky et al. (n 4); Erinoshio et al. (n 48).

⁶² CBD Decision V/6; CBD Decision VII/11.

⁶³ E. Morgera, ‘Far Away, So Close: A Legal Analysis of the Increasing Interactions between the Convention on Biological Diversity and Climate Change Law’ (2011) 2 *Climate Law* 85–115; Erinoshio et al. (n 48).

⁶⁴ CBD Decision VI/20.

⁶⁵ CMS (n 10), Art. II.

⁶⁶ CMS (n 10), Art. III(4).

shark and ray.⁶⁷ This obligation has been elaborated,⁶⁸ including through Resolution 12.21, obliging parties to ‘take into account potential social and environmental impacts on migratory species when developing and implementing relevant climate change mitigation and adaptation action’.⁶⁹ Parties are invited to interpret Article I(1)(c)(4) on ‘favourable conservation status’ in light of climate change ‘particularly with a view to climate-induced range shifts’ and ‘action beyond the historic range of species is compatible with, and maybe be required’ to meet CMS obligations.⁷⁰ This furthers the argument that States have a positive obligation to adapt management and conservation of shifting marine biodiversity. For context, Trouwborst and Blackmore have argued that this is enough to facilitate the necessary climate adaptation measures for large terrestrial carnivores, that is, protected areas, connectivity and dealing with non-climate threats can be achieved through implementation of this obligation.⁷¹ The same can be argued with regard to international legal obligations to adapt conservation and management of marine species in response to climate change.

12.3.2 UNCLOS Part XII and International Climate Law

The UN Framework Convention on Climate Change and its subsequent instruments constitute the body of international climate law.⁷² UNCLOS obligations for the protection and preservation of the marine environment include atmospheric pollution.⁷³ Part XII is informed by other applicable rules of international law,⁷⁴ and any breaches of ‘generally accepted international regulations’ are a breach of Part XII.⁷⁵ Article 212 on pollution of the ocean from or through the atmosphere, for example, brings the PA ‘within the scope of Part XII’.⁷⁶ The supportive

⁶⁷ CMS (n 10), Appendix I <www.cms.int/sites/default/files/basic_page_documents/appendices_cop13_e_o.pdf>.

⁶⁸ CMS Resolution 11.16.

⁶⁹ CMS Resolution 12.21, para. 3.

⁷⁰ *Ibid.* para. 9.

⁷¹ A. Trouwborst and A. Blackmore, ‘Hot Dogs, Hungry Bears and Wolves Running Out of Mountain: International Wildlife Law and the Effects of Climate Change on Large Carnivores’ (2020) 23 *Journal of International Wildlife Law & Policy* 212–238.

⁷² D. Bodansky et al., *International Climate Change Law* (Oxford: Oxford University Press, 2017) 10–11.

⁷³ M. McCreath, ‘Report of the Conference on Climate Change and the Law of the Sea: Adapting the Law of the Sea to Address the Challenges of Climate Change, Centre for International Law, National University of Singapore, 13–14 March 2018’ (2018) 33 *The International Journal of Marine and Coastal Law* 836–846; J. Harrison, *Saving the Oceans through Law* (Oxford: Oxford University Press, 2017) 246–274.

⁷⁴ *South China Sea Arbitration* (n 38) paras. 945–946.

⁷⁵ *Ibid.* para. 1083.

⁷⁶ A. Boyle, ‘Climate Change, Ocean Governance and UNCLOS’ in J. Barret and R. Barnes (eds.) *Law of the Sea: UNCLOS as a Living Treaty* (London: British Institute of International and Comparative Law, 2016) 211–230, 215; Harrison (n 73), 256; C. Redgwell, ‘Treaty Evolution,

interpretation of the two regimes has focused primarily on climate mitigation. The connection with adaptation provisions in the climate regime and UNCLOS is not as clear-cut.⁷⁷ As before, there is no direct obligation to adapt to changes in the marine environment due to climate change under UNCLOS; however, adaptation is included as a key response in the international climate change regime.⁷⁸ While it can be argued that these adaptation provisions do inform the obligations of UNCLOS Part XII, they are, unlike climate mitigation provisions, not target-based in nature.

Article 7 of the PA establishes the global goal on adaptation, enhancing adaptive capacity, strengthening resilience and reducing vulnerability to climate change, and parties have recognised that there is significant need for adaptation.⁷⁹ Understandably, the goal is general and does not point to specific targets, or how much or how little adaptation a party should undertake. Parties are obliged to strengthen their cooperation on adaptation enhancement through the Cancún Adaptation Framework, with sharing of information and practices, institutional arrangements, scientific knowledge, assisting developing countries in identifying adaptation practices and improving the effectiveness and durability of adaptation action.⁸⁰ Regional cooperation on adaptation is also specified in Article 7(7) of the PA.

Since the PA is universal in scope and applies to the ocean, parties can include adaptation to the effects of the marine environment within their national determined contributions (NDCs) – a set of national targets to inter alia reduce emissions and adapt to the effects of climate change. Some parties have already done this; however, only 33 per cent of NDC adaptation components submitted in early 2021 referred to the ocean, while 39 per cent mentioned fisheries as a specific adaptation sector or priority.⁸¹ This suggests greater effort is needed by States in including marine issues into climate adaptation, let alone species redistribution.

Adaptation and Climate Change: Is the LOSC “Enough” to Address Climate Change Impacts on the Marine Environment? (2019) 43 *The International Journal of Marine and Coastal Law* 1–18, 10; A. Boyle, ‘Law of the Sea Perspectives on Climate Change’ (2012) *The International Journal of Marine and Coastal Law* 831–838, 836.

⁷⁷ R. K. Craig, ‘Mitigation and Adaptation’ in E. Johansen et al. (ed.), *The Law of the Sea and Climate Change: Solutions and Constraints* (Cambridge: Cambridge University Press, 2021) 49–80; A. Boyle, ‘Protecting the Marine Environment from Climate Change’ in Johansen et al., 81–103, 84.

⁷⁸ UNFCCC (n 11), Art. 4(1); Paris Agreement (n 11), Arts. 7–10.

⁷⁹ *Ibid.* Art. 7(6).

⁸⁰ Paris Agreement (n 11), Art. 7(8).

⁸¹ *National Determined Contributions under the Paris Agreement* UN Doc. FCCC/PACMA/2021/2; M. Lennan, ‘Climate change and the oceans: NDC synthesis report suggests greater work to be done to mainstream marine issues into climate adaptation’ (2021) <<https://oneoceanhub.org/climate-and-the-oceans-ndc-synthesis-report-suggests-more-work-to-be-done-to-mainstream-climate-adaptation-and-oceans/>>.

With regard to international fisheries management, recent analysis has shown that decisions by some RFMO/As do consider climate change legal developments, which has increased over time since 2002.⁸² However, the majority of these decisions have been focused on learning climate issues, rather than active management decisions in response to climate change.⁸³ It is clear that adaptive action to climate change is necessary to adequately fulfil the obligation to protect and preserve the marine environment; however, this obligation must be informed at national level by States in their interpretation and application of the adaptation provisions of the climate legal regime.

12.3.3 Cooperation with Relevant States

International cooperation is vital for effective governance of marine species redistribution. Adaptation-based management must be achieved through increasing international and inter-State cooperation to either maintain or create transboundary agreements on conservation and exploitation of MLRs that may appear in new jurisdictions due to climate change.⁸⁴ Cooperation is considered fundamental in fulfilling the obligations of Part XII,⁸⁵ and enshrined in terms of conservation and exploitation of MLRs on a global or regional basis, considering regional features and protection of the marine environment in UNCLOS Article 197. Where a coastal State borders an enclosed or semi-enclosed sea, Article 197 is achieved through cooperation directly or through a regional organisation.⁸⁶ An example of fulfilling this duty would be through joining and participating in a regional marine environment body such as the Convention for the Protection of the Marine Environment in the North-East Atlantic, which facilitates international cooperation on environmental protection in that area.⁸⁷ CBD Article 5 outlines obligations to cooperate for the conservation and sustainable use of biological diversity.⁸⁸ Article 10(e) encourages cooperation between government authorities and the private sector in developing

⁸² J. Sumby et al., 'Hot Fish: The Response to Climate Change by Regional Fisheries Bodies' (2021) 123 *Marine Policy* 104284.

⁸³ *Ibid.*

⁸⁴ Scheffers and Peel (n 56) 584.

⁸⁵ *The MOX Plant Case (Ireland v. United Kingdom)*, Provisional Measures Order of 3 December 2000, ITLOS Reports 2001, para. 82; *Case Concerning Land Reclamation by Singapore in and around the Straits of Johor (Malaysia v. Singapore)*, Provisional Measures, Order of 8 October 2003, ITLOS Reports 2003, para. 92; *Fisheries Advisory Opinion* (n 38) para. 140.

⁸⁶ *South China Sea Arbitration* (n 38) paras. 984–986.

⁸⁷ 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.

⁸⁸ CBD (n 9), Art. 5; *See also* CBD (n 9), Art. 13(b) on cooperation with other States and international organisations in the development of educational and public awareness programmes concerning the conservation and sustainable use of biological diversity.

methods for sustainable use of biodiversity.⁸⁹ Parties to the CMS are obliged to cooperate in the conservation of species and habitat of migratory species.⁹⁰ As previously, these obligations should be read to support UNCLOS Part XII.

States bear 'both an individual and collective duty to cooperate'⁹¹ in the conservation of MLRs,⁹² and in the management, conservation and exploitation of transboundary fish stocks existing in the EEZs of two or more coastal States,⁹³ and on the High Seas.⁹⁴ Importantly, the biological unity of transboundary stocks is considered in their management, requiring cooperation across international and regional scales. Article 8 UNFSA elaborates and institutionalises this duty through establishment or joining of RFMO/As.⁹⁵ States are also required to cooperate within these organisations to improve their effectiveness in establishing and implementing CMMs for straddling and HM fish stocks.⁹⁶ Some RFMO/As conventions uphold the duty to cooperate,⁹⁷ and some have made a conscious effort to cooperate between organisations in response to species redistribution, though active improvement is necessary.⁹⁸

12.3.4 *Use of the Best Available Science*

Scientific research is central to developing and maintaining knowledge and understanding of the marine environment. This is necessary for informing natural resource managers' decisions and solutions. States are obliged under UNCLOS and the UNFSA to use the best science available in managing fish stocks within their jurisdiction,⁹⁹ and for transboundary stocks.¹⁰⁰ Molenaar argues that 'a qualified obligation on climate-change adaptation can be derived' from this obligation.¹⁰¹ In addition, to implement the precautionary principle and the EA, States are obliged to improve the decision-making process for MLR conservation and management by

⁸⁹ CBD (n 9), Art. 10(e).

⁹⁰ CMS (n 10), Art. II.

⁹¹ R. Rayfuse, 'Regional Fisheries Management Organizations' in D. Rothwell and T. Stephens (eds.), *Oxford Handbook on the Law of the Sea* (Oxford: Oxford University Press, 2017) 439–462, 440.

⁹² UNCLOS (n 7), Arts. 117–118.

⁹³ *Ibid.* Arts. 63–4.

⁹⁴ *Ibid.* Art. 118; UNFSA (n 8), Art. 8.

⁹⁵ UNFSA (n 8), Art. 8.

⁹⁶ *Ibid.* Art. 13.

⁹⁷ Convention on the Conservation and Management of High Seas Fisheries Resources in the South Pacific Ocean (SPRFMO) (2009) Art. 3; Convention on the Conservation of Antarctic Marine Living Resources (CCAMLR) (1980), Preamble.

⁹⁸ R. Rayfuse, 'Addressing Climate Change Impacts in Regional Fisheries Management Organizations', in R. Caddell and E. Molenaar (n 18) 247–268.

⁹⁹ UNCLOS (n 7), Art. 61(1–2).

¹⁰⁰ *Ibid.* Art. 119(1)(a); UNFSA (n 8), Art. 5(b).

¹⁰¹ E. J. Molenaar, 'Integrating Climate Change in International Fisheries Law', in Johansen (n 77) 263–288, 271.

obtaining and sharing the best available scientific information, as well as improving and implementing techniques dealing with risks and uncertainty.¹⁰² States must also determine stock-specific reference points based on the best science available and action to be taken when exceeded.¹⁰³ Emergency measures too must be based on the best available science.¹⁰⁴ UNFSA and RFMO/A conventions contain obligations to promote cooperation in utilisation of the best science.¹⁰⁵ The CMS also obliges States to use the best scientific evidence available to indicate that a migratory species is endangered.¹⁰⁶

12.3.5 *Interim Conclusions*

This section sought to outline the relevant international legal obligations to address the question of whether the international legal framework is fit for purpose in fostering adaptation by States to the complexities caused by fish and other marine species shifting their location across management jurisdictions. The author is inclined to answer in the affirmative, considering that there are no barriers on States in the framework that prevent or discourage adaptation in this context. However, the lengths that States go to in implementing adaptation measures is dependent on their interpretation and application of the relevant provisions in international climate law, and how these are applied to the marine environment. Adaptation measures must be informed by use of the best scientific evidence available, and of course cooperation between relevant States as MLRs shift across management boundaries. As such, the framework is adequate, but the efficacy of the framework to facilitate adaptation, and maintain the rule of law, depends on implementation of the obligations outlined in this section. The final section explores solutions that may aid in this.

12.4 ADAPTIVE RESPONSES TO FISHERIES REDISTRIBUTION: STRENGTHENING SOLUTIONS

Having attested to the adequacy of the international legal framework to facilitate adaptation to fisheries shifting distribution under climate change, this section briefly outlines two potential solutions that reflect the urgency of the need to adapt, and could help further strengthen the rule of law in this area.

The first involves exploiting the potential of the precautionary principle and EAF in implementing the obligations outlined earlier. The precautionary principle in combination with the obligation to cooperate could help in pushing States to agree pre-emptively to ensuring bi- or multi-lateral fisheries agreements for a stock that

¹⁰² UNFSA (n 8), Art. 6.3(a).

¹⁰³ *Ibid.* Art. 6.3(b).

¹⁰⁴ *Ibid.* Art. 6.7.

¹⁰⁵ *Ibid.* Art. 14; CCAMLR (n 97), Art. 15; SPRFMO (n 97), Art. 3.

¹⁰⁶ CMS (n 10), Art. 3.

may become transboundary. This could prevent conflicts arising when a fish stock shifts primarily into the jurisdiction of one State, which might be inclined to exploit that stock unilaterally.¹⁰⁷ Considering the EAF, which is widely accepted and called for in various international instruments,¹⁰⁸ aims to apply a holistic approach and account for ecosystem structure and function, and considers transboundary species and ecosystems,¹⁰⁹ is an important feature in addressing the problem of climate driven shifts. However, since depletion of some and arrival of new species due to climate change creates novel ecosystems, this complicates application of the EAF. In order to address this, guidelines on the application and implementation of the EAF should be revisited in light of climate change.¹¹⁰

The second taps into the role of the Food and Agriculture Organization of the United Nations (FAO) and its role in developing the international legal framework for fisheries and the marine environment. The FAO has developed a plethora of scientific and technical documents on the impacts of climate change and fisheries,¹¹¹ as well as on the EAF,¹¹² and also provides technical assistance to RFMO/As. The FAO Committee on Fisheries (COFI) recommended its members to strengthen efforts to assess change in distribution of fish species in response to climate change.¹¹³ The FAO has adopted many legally binding and non-legally binding instruments that aid various fisheries and marine environmental obligations. COFI has requested development of guidelines that focus on climate change impacts on fisheries in recent years.¹¹⁴ These could perhaps aid in developing the EAF vis-à-vis climate change, facilitate cooperative management both bilaterally and within an RFMO/A context, and as such would be incredibly valuable in assisting States in implementing their obligations to adapt fisheries management in response to climate change.

To conclude, the international legal framework can facilitate adaptation to marine species redistribution under climate change, and can be described as adequate at best, and not a barrier at worst. There is a greater need for States and legal researchers to engage with the jurisdictional and managerial problems created by the redistribution of fisheries and other marine species. In terms of state practice,

¹⁰⁷ See text after n 21; Østhagen (n 22); Spijkers (n 23).

¹⁰⁸ CBD, Decision V/6.

¹⁰⁹ FAO, 'The Ecosystem Approach to Fisheries' *FAO Fisheries Technical Paper* 443 (2003).

¹¹⁰ CBD Decision X/2; CBD Decision XI/18, para. 2.

¹¹¹ FAO, 'Climate Change Implications for FISHERies and Aquaculture: Overview of Current Scientific Knowledge' *FAO Fisheries and Aquaculture Technical Paper* 530 (2009); FAO, 'Impacts of Climate Change on Fisheries and Aquaculture' *FAO Fisheries and Aquaculture Technical Paper* 627 (2018).

¹¹² FAO (n 109).

¹¹³ Report of the 29th Session of FAO Committee on Fisheries (2011), para. 40a.

¹¹⁴ Report of the 32nd (2016) COFI Session, paras. 16 and 114; Report of the 33rd COFI Session (2018), para. 101; See also Molenaar (n 101) 274.

a regional approach and cooperation through appropriate regional bodies such as RFMO/As and FAO is vital for effective adaptive management. Further, these regional bodies must enable adaptive management through inter-institutional cooperation, and engagement with research. In terms of research, the need is for greater multi- or cross-disciplinary research exploring the role of dynamic management of marine biodiversity while ensuring the law applicable to it is still robust enough to provide safeguards for marine species conservation facing climate impacts.