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Building a regime complex for marine plastic pollution

Elizabeth Mendenhall

Department of Marine Affairs, University of Rhode Island, Kingston, RI, USA

Review

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Corresponding author:
Elizabeth Mendenhall;
Email: mendenhall@uri.edu

Abstract

The negotiations for a new treaty to govern the 'full lifecycle' of plastics face a major challenge: designing a strong treaty, quickly, that is acceptable to most of the international community of states. Although diplomats play a critical role in accomplishing this task, scholars and researchers represent a critical network of support, especially on the topic of treaty design. This article outlines a research agenda focused on the new treaty as part of a larger 'regime complex,' where the interfaces between the new treaty and existing agreements will strongly shape its efficacy, efficiency, and acceptance by states. It also begins to pursue this research agenda, by investigating the relationship between the ocean governance regime, especially the United Nations Convention on the Law of the Sea, and the emerging plastics treaty. The article illustrates that the ocean governance regime offers important normative foundations, institutional models, lessons about treaty language, and possibilities for institutional linkage that can inform the design of the plastics treaty. It concludes by identifying several other avenues of useful research on the nascent plastics regime complex.

Impact statement

This article describes a research agenda to support the negotiations for a new plastics treaty, focused on the interaction between the treaty and other agreements. It also starts to pursue this agenda by investigating the relationship between the new plastics treaty and the ocean governance regime.

Building a regime complex for marine plastic pollution

The problem of marine plastic pollution first captured worldwide public attention in the late 1990s, when Captain Charles Moore 'discovered' and vividly described an expansive floating mass of plastic in the Pacific Ocean (Moore, 2014). The idea that plastic litter was harmful to the environment, and especially our enjoyment of natural spaces, had been a feature of the environmental movement since the 1970s (Krieger, 1973). But the sheer magnitude of plastic in the ocean, and the negative consequences for marine life, were underappreciated until the 21st century. In many ways, marine plastic pollution is a 21st century environmental problem, with deep roots in 20th century industrialization, commercialization, and globalization. The production and consumption of plastics has many negative impacts on human health, environmental justice, and marine and terrestrial environments (Derraik, 2002; Cole et al., 2011; Green et al., 2015; Kuhn et al., 2015; Li et al., 2016; Rochman et al., 2016; Avio et al., 2017; Niaounakis, 2017; Villarrubia-Gómez et al., 2017; Kedzierski et al., 2018; Lamb et al., 2018). But it was the large accumulations of plastic waste in the ocean that first put the problem of plastics on the diplomatic agenda by alerting international publics to the scale of the problem.

Now, a quarter of a century after Captain Moore's clarion call, the international community is poised to negotiate a new international treaty for plastics, which is intended to take a 'full life cycle' approach that addresses plastics production (upstream), consumption (midstream), and disposal (downstream). The hope is that a treaty can be finalized in 2 years (Stokstad, 2022). But to succeed, the new plastics treaty also will need a strong design that is acceptable to enough members of the international community to enter into force. Quick negotiation of a strong treaty with consensus support is a very, very difficult 'ask' in the current international political environment. Three factors militate against a strong treaty: conservative and plutocratic political trends in the developed world, geo-strategic competition between the US, China, and Russia, and a powerful multinational fossil fuel industry that is already facing pressure from renewable energy sources. Those who are hopeful about the efficient negotiation of a well-designed plastics treaty argue that publics will pressure national leaders to 'do the right thing.' The efforts of civil society, non-governmental organizations, and academic researchers can also make important contributions to the treaty building process (Mendenhall, 2018).

Much has been written on the best design for a new plastics treaty (Raubenheimer and McIlgorm, 2017; Tessnow-von Wysocki and Le Billon, 2019; Fritz, 2020; Simon et al., 2021; Bergmann et al., 2022). This scholarship often draws on existing models of international governance, as well as broad concepts such as the 'circular economy,' to forward specific proposals for a strong and effective treaty. Another approach looks at existing international agreements as the legal and political context that the plastics treaty will have to fit into. One important focus will be regime formation – the *integration* of the new plastics treaty with existing international agreements that have overlapping goals, mandates, and functions. Research on the interplay between legal instruments, and the institutions and organizations they empower, supports good regime design. The new plastics treaty will likely become the central framework agreement in a global governance regime for plastics which is currently nascent and ineffectual. Because the plastics treaty will take a full lifecycle approach, it will likely have an important relationship with existing international norms and laws on trade (in products and waste), health and safety, and capacity building and development aid. But regime interaction is not a straight-forward process, and decisions must be made about the relationship between existing instruments, frameworks, and bodies and the new plastics treaty.

A broad research agenda that investigates the relationship between the emerging plastics treaty and existing international legal agreements will be critical to supporting the most effectual and efficient treaty design. It is highly likely that the new plastics treaty will play a coordinating role in a larger 'regime complex,' which is "an array of partially overlapping and nonhierarchical institutions that includes more than one international agreement or authority" (Alter and Raustiala, 2018). There is a large body of work on regime complexes in other areas of international law and politics, including climate change, plant genetic resources, bioenergy, refugees, food security, and other issue areas (Raustiala and Victor, 2004; Betts, 2010; Keohane and Victor, 2011; Abbott, 2012; Margulis, 2013; Naiki, 2016). The recently concluded negotiations for a new treaty for 'Biodiversity Beyond National Jurisdiction' (BBNJ) demonstrate the challenges of building a regime complex, and scholarship on the BBNJ treaty has carefully traced the actual and potential interactions between the new agreement and existing frameworks, instruments, and bodies (Marciniak, 2017; Young and Friedman, 2018; Oude Elferink and Kerr, 2021; Langlet and Vadrot, 2023).

Scholarly research about the relationships between the new plastics treaty and existing agreements is useful in characterizing possible, potential, and preferable types of institutional interactions. A central question is whether hierarchy between international frameworks, bodies, and instruments is possible or needed. In a crowded governance space, lack of hierarchy means lack of coordination. Fragmentation is "a ubiquitous structural characteristic of global governance architectures" but can take different forms, which have different degrees of functionality and effectiveness (Biermann et al., 2009). The plastics treaty will shape the nature of this fragmentation, and the character of the emerging regime complex, by defining the relationships between it and existing relevant institutions and agreements with overlapping focus. The character of a plastics regime complex represents an important research agenda.

This review article starts that project by characterizing an important part of the emerging global regime for plastics: the international law of the sea applicable to the problem of marine plastic pollution. Essentially, the article inventories the areas of overlap between the ocean governance regime and the emerging plastics treaty, and identifies relevant obstacles, challenges, lessons, models, and opportunities that should inform its design. There are two main reasons that international ocean law should be taken seriously as a part of the emerging plastics governance regime, despite only containing "downstream" aspects of the plastics pollution problem.

First – the law of the sea, and specifically the United Nations Convention on the Law of the Sea (UNCLOS), inscribes duties and rights to marine resources and ocean space. As a result, its relationship with plastic pollution is largely constructed around the *consequences* of plastic pollution. The obligations on coastal states – those from whom plastic flows directly into the ocean – are geared toward achieving outcomes, specifically the reduction, prevention, and control of pollution. The ocean governance regime clearly connects the problems caused by marine plastic pollution with the obligation to address it. Any new plastics agreement could be usefully framed as supporting the implementation and domestication of UNCLOS legal requirements.

Second – the ocean governance regime, and especially its framework convention UNCLOS, has wide subscription and support in the international community. In short, it is relatively credible, authoritative, and stable. UNCLOS also contains a compulsory dispute settlement system. There is potential for the progressive development of this regime to strengthen the obligations on states through in-built adaptation mechanisms, rules of reference, and evolutionary interpretation of terms (Buga, 2015). Identifying points of synergy between the new plastics treaty and the existing ocean governance regime can support the creation of an interlocking set institutions with coherent and mutually reinforcing functions. In other words, a stronger overall regime.

The main body of the article will inventory, discuss, and assess the existing provisions on plastic pollution that can be found in the ocean governance regime. This can be understood as a kind of 'institutional diagnostics,' with the objective of highlighting important areas of overlap and complementarity, including the identification of challenges, models, lessons, and opportunities (Young, 2011).

Sea-based plastic pollution

Most marine plastic pollution comes from the land, but most rules for pollution are focused on ships. By definition, these rules and regulations apply exclusively "downstream" in the plastics life cycle. But they are valuable parts of the plastic regime complex because they target some of the most damaging plastic pollution and strengthen the norms against plastics emissions from intentional and unintentional sources. Existing agreements around sea-based plastic pollution provide useful models, but also contain important weaknesses that should be addressed by a new plastics treaty.

There are several successful agreements that regulate sea-based sources of marine pollution, including operational emissions, accidents, and dumping. Most of these, such as MARPOL Annex V and the London Convention/Protocol, were formulated and implemented under the auspices of the International Maritime Organization (IMO). MARPOL Annex V (Prevention of Pollution by Garbage from Ships) includes a total ban on disposing plastics at sea. The list of prohibited discharge includes "plastics, synthetic ropes, fishing gear, plastic garbage bags." This ban on is reaffirmed by the 1996 London Protocol, but some states are members of the older London Convention which only bans the dumping of "Persistent plastics… for example, netting and ropes, which may…

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interfere materially with fishing, navigation, or other legitimate uses of the sea." This suggests a need for the plastics treaty to strengthen the ban on dumping plastics to cover the gap in membership in the stronger London Protocol, and reaffirm the obligations contained in MARPOL Annex V.

It is notable that a marine pollution agreement administered by the IMO is the source of a total ban on the disposal of fishing gear at sea (as opposed to, e.g., a fishing-related agreement). Another example where plastic from fishing is regulated as marine pollution concerns the abandonment of Fish Aggregation Devices (FADs), which can have very negative effects through 'ghost fishing.' FADs are essentially floating or anchored materials intended to attract and detect fish for efficient capture. They are sometimes made of plastic, and most drifting FADs are never retrieved (Churchill, 2021, 170). Abandoning FADs would both qualify as marine pollution under UNCLOS, and be an illegal form of dumping under the London Protocol and MARPOL Annex V (Churchill, 2021). Some elements of the plastics regime targeting fishing gear do come from fisheries-focused organizations, but these are relatively weak obligations. Obligations related specifically to derelict fishing gear (often plastic nets) can be found in the 1995 Fish Stocks Agreement, although these are imprecise and only supplemented by soft law instruments (Hodgson, 2022). The 2018 U.N. Food and Agriculture Organization Voluntary Guidelines on the Marking of Fishing Gear recommend the use of fishing gear marking to enhance accountability for loss and abandonment of gear (He and Suuronen, 2018).

Regulation of sea-based plastic pollution has been successful in part because of a flexible institutional architecture that (to some degree) incorporates industry actors. The IMO contains a well-articulated committee structure, with opportunities for industry actors to provide input on the creation of technical guidelines. Many IMO-administered agreements also use flexible mechanisms for update and revision, such as the 'tacit acceptance procedure' whereby new specifications apply to members unless they explicitly object. This allows for regular updating of technical standards by experts who understand the ramifications of such changes for maritime industry, and who can help identify lower cost and innovative solutions. There is significant skepticism about industry led solutions for plastics, such as recycling and bio-based plastics (Dauvergne, 2018). The example of the IMO demonstrates the potential benefits of working with industry through a detailed committee structure that makes decisions on technical standards, so that understanding of the feasibility and economics of alternatives is worked into decision-making.

Two IMO agreements related to oil pollution offer useful models for the case of accidental plastic spills, such as has been known to occur with 'nurdles' at the beginning of the plastics life cycle (Tunnell et al., 2020; De Vos et al., 2022). The 1992 Civil Liability Convention requires member states to make insurance compulsory for ship owners, such that the insurers can be sued for payment (Gaskell, 2018, 242). This helps ensure that the money is 'there' in the event of harm or damage. In case those funds are insufficient, the 1992 Fund Convention establishes a system for imposing levies on those who receive oil by sea to create a fund for cleanup and environmental rehabilitation in the event of a major spill. This separates the need to prove liability from the ability to mobilize funds for remediation. Funds could theoretically be used for either compensation or cleanup. Such models could be used to ensure that the plastics industry is required to finance cleanup and compensation in the event of plastics spills. But drawing funds from those who transport plastic (in its various forms) and those who receive plastic does not make sense from an accountability perspective. This approach excludes plastic producers, who are generally understood to be 'responsible' for the vast amounts of marine plastic pollution. But the governance tools of compulsory insurance and pooled industry funds could be useful in other parts of the emerging plastics regime complex.

Land-based plastic pollution

UNCLOS was the first international agreement to enshrine a general obligation to preserve and protect the marine environment, initiating a "paradigm shift from the principle of freedom to pollute to an obligation to prevent pollution" (Tanaka, 2015, 328). UNCLOS Part XII begins with a direct statement: "States have the obligation to protect and preserve the marine environment" (Article 192). In doing so, states should take "all measures… that are necessary to prevent, reduce and control pollution of the marine environment from any source, using for this purpose the best practicable means at their disposal and in accordance with their capabilities" (Article 194). Part XII also contains specific obligations related to different sources of pollution: ship-based, land-based, atmospheric, and pollution from seabed activities. In general, the regime is more articulated and obligatory regarding ship-based pollution compared to the other sources (Beckman 2015, 148). But there are significant provisions related to land-based pollution.

UNCLOS calls upon states to cooperate in the development of new international rules for managing plastic pollution. The so-called "rules of reference" are a means by which UNCLOS strengthens the ocean governance regime more broadly, by "securing the primacy of international rules and standards over national laws and regulations" (Konig, 2013). There are two types of rules of reference. The first requires states to work through "competent international organizations" or "diplomatic conference" to develop specific rules, standards, and best practices. This is essentially a requirement for member states to continue to work on building the set of international rules and norms targeting marine pollution. The second type requires member states to create domestic laws with reference to relevant international rules created *outside* of UNCLOS. The "main objective" of rules of reference is "to make international rules and standards binding on States that would otherwise not be bound in order to achieve a uniform global practice" (Konig, 2013). The reference technique can also be understood as "an adaptation mechanism that reduces the need for modification by subsequent practice" (Buga, 2015, 66).

Unfortunately, the rules of reference for land-based pollution are a particularly weak formulation. As far as acting through "competent international organizations or diplomatic conference," the requirement is that states "shall endeavor to establish" additional rules and standards. In other words, they are only obligated to try, not to develope additional rules and standards. Article 207(3) also requires states to "harmonize their policies [on land-based pollution]…at the appropriate regional level." This has been pursued to some degree in the voluntary marine litter action plans associated with the UNEP Regional Seas Programme. As far as domesticating external international law, states are required to "adopt laws and regulations to prevent, reduce and control pollution of the marine environment…*taking into account* internationally agreed rules, standards, and recommended practices" (emphasis added) (Article 207). This is a weaker formulation than the rules of

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reference for vessel-source pollution which position international rules and standards as a minimum standard.[1]

At least three conclusions can be drawn about the relationship between UNCLOS Part XII and the emerging plastics treaty. First – UNCLOS provides a strong normative foundation for the plastics treaty, and one that most of the international community has agreed to. Indeed, UNCLOS is the only international agreement that "provides the mandate for the prevention of marine plastic debris on a global scale" (Raubenheimer and McIlgorm, 2017, 324). The plastics treaty can build on this foundation. Second – caution can be taken from the imprecise formulation of UNCLOS treaty language, which has generally failed to shape state behavior to address plastic pollution. In short, "these provisions are too general to be useful" (Tanaka, 2015, 279). The plastics treaty should not recreate these flaws with imprecise language and low levels of obligation to domesticate rules and standards. Third – the weaker version of rules of reference ("taking into account") means that UNCLOS cannot lend its legal authority to rules developed external to it, and therefore will not be useful in the effort to create a uniform international legal standard for the reduction, prevention, and control of land-based pollution.

Dispute settlement and liability

One means of activating and applying the provisions of UNCLOS Part XII is the compulsory dispute settlement system created by UNCLOS. The creation of this system was a "major step forward" for international dispute settlement (Jensen and Bankes, 2017, 210). This is a way to strengthen UNCLOS obligations from within, using the institutional structure created by the convention to apply and interpret its provisions. In short, "courts and tribunals do more than simply apply the law: they are part of the process of its continuing evolution" (Jensen, 2020, 7). States parties are required to settle disputes peacefully, and if direct negotiations cannot resolve an issue, they have three options for third party dispute settlement: the International Court of Justice (ICJ), International Tribunal on the Law of the Sea (ITLOS), and arbitration through an ad hoc arbitral tribunal. Theoretically, one member of UNCLOS could sue another member for violating the provisions of Part XII. But practically, usage of this mechanism has been limited.

Part XII has only been used in two dispute settlement cases, one concerning pollution from land reclamation, and the other concerning discharges of mixed oxide fuel. In both cases, the marine pollution was clearly transboundary, so the coastal states bringing the suit had obvious standing against the neighboring state whose activities were causing the pollution. In both cases, ITLOS issued provisional measures to reduce damage and harm in the interim between the case being brought and resolved. It would be more difficult to bring a case related to marine plastic pollution, for two basic reasons. First, the difficulty of tracing the source of plastics in the ocean makes it difficult to determine who might be held accountable for those emissions. Second, most marine plastic pollution seems to be accumulating beyond national jurisdiction, so that it would be very difficult for an individual state to argue that its *specific* interests have been *directly* harmed, which is currently a requirement for standing to sue (Kimball, 2003, 25; Ha, 2020). The issue of standing, and questions of accountability, could theoretically be addressed by a new plastics treaty.

The dispute settlement system for UNCLOS offers both opportunities and lessons for the emerging plastics treaty. Although there is a possibility that Part XII obligations related to land-based pollution could be applied, interpreted, and thereby strengthened through legal rulings, so far states seem unwilling, uninterested, or unable to bring specific cases about plastics. This is a more general phenomenon in international politics, and ocean governance, in particular: the "exceptional, haphazard, and sporadic" use of judicial means of dispute settlement (Churchill, 2017, 225). But several factors suggest that more use could be made of this system, including the increasing involvement of private law firms, the generality of UNCLOS provisions, and the authority of courts themselves to decide questions of standing and jurisdiction (Harrison, 2017, 271–278). Another option would be for an individual state to request Advisory Opinions on the meaning of particular UNCLOS provisions, although the two Advisory Opinions issued thus far have forwarded a relatively weak "due diligence" standard.

It would be possible for the new plastics treaty to incorporate ITLOS into any dispute settlement system it creates. The jurisdiction of ITLOS includes "all matters specifically provided for in any other agreement which confers jurisdiction on the Tribunal" (Annex VI, Article 21). At the time of writing, at least 17 other multilateral agreements have conferred jurisdiction to ITLOS. Because it is a newer tribunal compared to the ICJ, ITLOS arguably has less political 'baggage' and therefore might be seen as a preferable option to some states (Churchill, 2017, 220). Even if ITLOS is not used directly, it could serve as a useful model. Two aspects of its design stand out as particularly relevant. First, the requirement for judges to have subject matter expertise (in this case, "recognized competence in the field of the law of the sea"), and second, the conferral upon ITLOS of special jurisdiction for two types of cases – prompt release of vessels and crew, and provisional measures. These features of ITLOS composition and jurisdiction could be replicated in the context of a plastics treaty.

Future perspectives

There are many knowledge gaps in the field of marine plastic pollution, and filling these gaps is important to propel policy development (Mendenhall, 2018). Now that the negotiations for a new plastics treaty are underway, however, researchers with expertise in law, politics, and social science should prioritize research that supports the development of a functional regime complex. The new plastics treaty will be at the core of a global governance regime for plastics. In order to be maximally effective, efficient, and embraced by the international community of states, the new treaty will have to establish complementary and mutually supportive relationships with existing international agreements and legal instruments, including UNCLOS. Researchers can make a valuable contribution to sketching out these relationships, first by identifying important overlaps, and second by considering the different options for institutional interfaces. There is some urgency around this research agenda, as the links between the plastics treaty and other international agreements will be forged during the negotiations (Langlet and Vadrot, 2023, 2).

This article has provided an initial sketch of what such scholarship might look like, by investigating the overlaps and potential relationships between the new treaty and UNCLOS. There is more work to be done in this specific area, including for example the

[1]For vessel-based pollution, states shall adopt laws and regulations that "at least have the same effect as that of generally accepted international rules and standards" (Article 211(2)).

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lessons to be learned from UNCLOS provisions on technology transfer and the use of scientific evidence as the basis for decision making. But there are also other important regime connections to explore, such as those with the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal, and the Stockholm Convention on Persistent Organic Pollutants. Future research should also look to other dispute settlement systems, such as that contained in the World Trade Organization system, in order to identify both useful models and opportunities to incorporate existing tribunals and associated procedures into the new plastics treaty.

An interlocking regime complex has advantages, from a negotiation and implementation perspective. External but related agreements represent commitments the international community of states has *already* made, and topics that the negotiators do not necessarily have to address. In some cases, however, existing agreements *will* require additional diplomatic work and legal architecture, either because they are undersubscribed (low number of ratifications) or because they set a too-low standard. For that reason, the research agenda for a plastics regime complex should be attentive to the weakness and failures of existing agreements as well as the models, lessons, and legal and conceptual resources they provide.

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References

Abbott KW (2012) The transnational regime complex for climate change. *Environment and Planning C: Government and Policy* **30**(4), 571–590. https://doi.org/10.1068/c11127.

Alter KJ and Raustiala K (2018) The rise of international regime complexity. *Annual Review of Law and Social Science* **14**(1), 329–349. https://doi.org/10.1146/annurev-lawsocsci-101317-030830.

Avio CG, Gorbi S and Regoli F (2017) Plastics and microplastics in the oceans: From emerging pollutants to emerged threat. *Marine Environmental Research* **128**, 2–11. https://doi.org/10.1016/j.marenvres.2016.05.012.

Beckman R (2015) "State Responsibility and Transboundary Marine Pollution." In Jayakumar S, Koh TTB, Beckman RC, Phan HD, and National University of Singapore (eds), *Transboundary Pollution: Evolving Issues of International Law and Policy, NUS Centre for International Law Series*. Cheltenham, UK: Edward Elgar Publishing, 137–62.

Bergmann M, Almroth BC, Brander SM, Dey T, Green DS, Gundogdu S, Krieger A, Wagner M and Walker TR (2022) A global plastic treaty must cap production. *Science* **376**(6592), 469–470. https://doi.org/10.1126/science.abq0082.

Betts A (2010) The refugee regime complex. *Refugee Survey Quarterly* **29**(1), 12–37. https://doi.org/10.1093/rsq/hdq009.

Biermann F, Pattberg P, van Asselt H and Zelli F (2009) The fragmentation of global governance architectures: A framework for analysis. *Global Environmental Politics* **9**(4), 14–40.

Buga I (2015) Between stability and change in the law of the sea convention: Subsequent practice, treaty modification, and regime interaction. In Rothwell DR, Elferink AGO, Scott KN and Stephens T (eds), *The Oxford Handbook of the Law of the Sea*. Oxford: Oxford University Press, pp. 46–68.

Churchill R (2017) The general dispute settlement system of the UN convention on the law of the sea: Overview, context, and use. *Ocean Development & International Law* **48**(3–4), 216–238. https://doi.org/10.1080/00908320.2017.1327287.

Churchill R (2021) Just a harmless fishing FAD—or does the use of FADs contravene international marine pollution law? *Ocean Development & International Law* **52**, 169–192. https://doi.org/10.1080/00908320.2021.1901342.

Cole M, Lindeque P, Halsband C and Galloway TS (2011) Microplastics as contaminants in the marine environment: A review. *Marine Pollution Bulletin* **62**(12), 2588–2597. https://doi.org/10.1016/j.marpolbul.2011.09.025.

Dauvergne P (2018) Why is the global governance of plastic failing the oceans? *Global Environmental Change* **51**, 22–31. https://doi.org/10.1016/j.gloenvcha.2018.05.002.

Derraik JGB (2002) The pollution of the marine environment by plastic debris: A review. *Marine Pollution Bulletin* **44**(9), 842–852. https://doi.org/10.1016/S0025-326X(02)00220-5.

Fritz J-S (2020) Governing plastics pollution in the ocean: From anarchy to mission orientation. In Chircop A, Coffen-Smout S, and McConnell ML (eds), *Ocean Yearbook*. Leiden: Brill, pp. 231–254.

Gaskell N (2018) Liability and compensation regimes: Pollution of the high seas. In Beckman RC, McCreath M, Roach JA and Sun Z (eds), *High Seas Governance*. Leiden: Brill, pp. 229–272. https://doi.org/10.1163/9789004373303_009.

Green DS, Boots B, Blockley DJ, Rocha C, and Thompson R (2015) Impacts of discarded plastic bags on marine assemblages and ecosystem functioning. *Environmental Science & Technology* **49**(9), 5380–5389. https://doi.org/10.1021/acs.est.5b00277.

Ha C (2020) Criminal jurisdiction for ship collision and marine pollution in high seas-focused on the 2015 judgement on M/V Ernest Hemingway case. *Journal of International Maritime Safety, Environmental Affairs, and Shipping* **4**(1), 8–15. https://doi.org/10.1080/25725084.2020.1717304.

Harrison J (2017) Defining disputes and characterizing claims: Subject-matter jurisdiction in law of the sea convention litigation. *Ocean Development & International Law* **48**(3–4), 269–283. https://doi.org/10.1080/00908320.2017.1328924.

He P and Suuronen P (2018) Technologies for the marking of fishing gear to identify gear components entangled on marine animals and to reduce abandoned, lost or otherwise discarded fishing gear. *Marine Pollution Bulletin* **129**(1), 253–261. https://doi.org/10.1016/j.marpolbul.2018.02.033.

Hodgson S (2022) *Legal Aspects of Abandoned, Lost or Otherwise Discarded Fishing Gear*. Rome: FAO and IMO. https://doi.org/10.4060/cb8071en.

Jensen Ø (ed.) (2020) *The Development of the Law of the Sea Convention: The Role of International Courts and Tribunals*. Cheltenham: Edward Elgar Publishing Limited.

Jensen Ø and Bankes N (2017) Compulsory and binding dispute resolution under the United Nations convention on the law of the sea: Introduction. *Ocean Development & International Law* **48**(3–4), 209–215. https://doi.org/10.1080/00908320.2017.1328927.

Kedzierski M, D'Almeida M, Magueresse A, Le Grand A, Duval H, César G, Sire O, Bruzaud S and Le Tilly V (2018) Threat of plastic ageing in marine environment. Adsorption/desorption of micropollutants. *Marine Pollution Bulletin* **127**, 684–694. https://doi.org/10.1016/j.marpolbul.2017.12.059.

Keohane RO and Victor DG (2011) The regime complex for climate change. *Perspectives on Politics* **9**(1), 7–23. https://doi.org/10.1017/S1537592710004068.

Kimball LA (2003) *International Ocean Governance: Using International Law and Organizations to Manage Marine Resources Sustainability*. Gland: IUCN.

Konig D (2013) Marine environment, international protection. In Peters A (ed), *Max Planck Encyclopedia of Public International Law*. Oxford: Oxford Public International Law. Oxford University Press.

Krieger MH (1973) What's wrong with plastic trees?: Rationales for preserving rare natural environments involve economic, societal, and political factors. *Science* **179**(4072), 446–455. https://doi.org/10.1126/science.179.4072.446.

Kuhn S, **Rebolledo ELB and van Franeker JA** (2015) Deleterious effects of litter on marine life. In Bergmann M, Gutow L and Klages M (eds), *Marine Anthropogenic Litter*. Cham: Springer International Publishing, pp. 75–116. https://doi.org/10.1007/978-3-319-16510-3.

Lamb JB, **Willis BL**, **Fiorenza EA**, **Couch CS**, **Howard R**, **Rader DN**, **True JD**, **Kelly LA**, **Ahmad A**, **Jompa J and Harvell CD** (2018) Plastic waste associated with disease on coral reefs. *Science* **359**(6374), 460–462. https://doi.org/10.1126/science.aar3320.

Langlet A and Vadrot ABM (2023) Not 'undermining' who? Unpacking the emerging BBNJ regime complex. *Marine Policy* **147**, 105372. https://doi.org/10.1016/j.marpol.2022.105372.

Li WC, **Tse HF and Fok L** (2016) Plastic waste in the marine environment: A review of sources, occurrence and effects. *Science of the Total Environment* **566–567**, 333–349. https://doi.org/10.1016/j.scitotenv.2016.05.084.

Marciniak KJ (2017) New implementing agreement under UNCLOS: A threat or an opportunity for fisheries governance? *Marine Policy* **84**, 320–326. https://doi.org/10.1016/j.marpol.2017.06.035.

Margulis ME (2013) The regime complex for food security: Implications for the global hunger challenge. *Global Governance* **19**, 53–67.

Mendenhall E (2018) Oceans of plastic: A research agenda to propel policy development. *Marine Policy* **96**, 291–298. https://doi.org/10.1016/j.marpol.2018.05.005.

Moore CC (2014) *Plastic Ocean: How a Sea Captain's Chance Discovery Launched a Determined Quest to Save the Oceans*. New York: Avery.

Naiki Y (2016) Trade and bioenergy: Explaining and assessing the regime complex for sustainable bioenergy. *European Journal of International Law* **27**(1), 129–159. https://doi.org/10.1093/ejil/chw004.

Niaounakis M (2017) The problem of marine plastic debris. In Niaounakis M (ed.), *Management of Marine Plastic Debris*. Oxford: Elsevier, pp. 1–55. https://doi.org/10.1016/B978-0-323-44354-8.00001-X.

Oude Elferink A and Kerr BP (2021) Finding a home for BBNJ – The CBD, the LOSC, and the general assembly: Complementary alternatives? In De Lucia V, Oude Elferink A and Nguyen LN (eds), *International Law and Marine Areas beyond National Jurisdiction*. Leiden: Brill, pp. 174–204. https://doi.org/10.1163/9789004506367_008.

Raubenheimer K and McIlgorm A (2017) Is the Montreal protocol a model that can help solve the global marine plastic debris problem? *Marine Policy* **81**, 322–329. https://doi.org/10.1016/j.marpol.2017.04.014.

Raustiala K and Victor DG (2004) The regime complex for plant genetic resources. *International Organization* **58**(02), 277–309. https://doi.org/10.1017/S0020818304582036.

Rochman CM, **Browne MA**, **Underwood AJ**, **van Franeker JA**, **Thompson RC and Amaral-Zettler LA** (2016) The ecological impacts of marine debris: Unraveling the demonstrated evidence from what is perceived. *Ecology* **97**(2), 302–312. https://doi.org/10.1890/14-2070.1.

Simon N, **Raubenheimer K**, **Urho N**, **Unger S**, **Azoulay D**, **Farrelly T**, **Sousa J**, **van Asselt H**, **Carlini G**, **Sekomo C**, **Schulte ML**, **Busch P-O**, **Wienrich N and Weiand L** (2021) A binding global agreement to address the life cycle of plastics. *Science* **373**(6550), 43–47. https://doi.org/10.1126/science.abi9010.

Stokstad E (2022) United Nations to tackle global plastics pollution. *Science* **375**(6583), 801–802. https://doi.org/10.1126/science.ada1551.

Tanaka Y (2015) *The International Law of the Sea*, 2nd Edn. Cambridge: Cambridge University Press.

Tessnow-von Wysocki I and Le Billon P (2019) Plastics at sea: Treaty design for a global solution to marine plastic pollution. *Environmental Science & Policy* **100**, 94–104. https://doi.org/10.1016/j.envsci.2019.06.005.

Tunnell JW, **Dunning KH**, **Scheef LP and Swanson KM** (2020) Measuring plastic pellet (nurdle) abundance on shorelines throughout the Gulf of Mexico using citizen scientists: Establishing a platform for policy-relevant research. *Marine Pollution Bulletin* **151**, 110794. https://doi.org/10.1016/j.marpolbul.2019.110794.

Villarrubia-Gómez P, **Cornell SE and Fabres J** (2017) Marine plastic pollution as a planetary boundary threat – The drifting piece in the sustainability puzzle. *Marine Policy* **96**, 213–220. https://doi.org/10.1016/j.marpol.2017.11.035.

Vos A, **Aluwihare L**, **Youngs S**, **DiBenedetto MH**, **Ward CP**, **Michel APM**, **Colson BC**, **Mazzotta MG**, **Walsh AN**, **Nelson RK**, **Reddy CM and James BD** (2022) The *M/V X-Press Pearl* nurdle spill: Contamination of burnt plastic and unburnt nurdles along Sri Lanka's beaches. *ACS Environmental Au* **2**(2), 128–135. https://doi.org/10.1021/acsenvironau.1c00031.

Young MA and Friedman A (2018) Biodiversity Beyond National Jurisdiction: Regimes and their interaction. *AJIL Unbound* **112**, 123–128. https://doi.org/10.1017/aju.2018.47.

Young O (2011) Land use, environmental change, and sustainable development: The role of institutional diagnostics. *International Journal of the Commons* **5**(1), 244.

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