

## Opportunities for improving global marine conservation through multilateral treaties

Dalal Al-Abdulrazzak<sup>a,b,\*</sup>, Grantly R. Galland<sup>c</sup>, Loren McClenachan<sup>d</sup>, John Hocevar<sup>e</sup>

<sup>a</sup> Ocean Wise Conservation Association, Vancouver, BC, Canada V6B 3X8

<sup>b</sup> Institute for the Oceans and Fisheries, University of British Columbia, Vancouver, BC, Canada V6T 1Z4

<sup>c</sup> Galland Consulting, Washington, DC 20009, USA

<sup>d</sup> Environmental Studies Program, Colby College, Waterville, ME 04901, USA

<sup>e</sup> Greenpeace, Washington, DC 20001, USA

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### ABSTRACT

The speed and scale of human impacts on marine species, such as climate change and exploitation for international markets, coupled with a poor regulatory regime and lack of enforcement, make it especially difficult to protect marine species beyond areas of national jurisdiction. Yet as the number of multilateral treaties continues to grow, the declining state of the world's oceans suggest that these treaties are largely failing to fulfill their missions and achieve meaningful protection. Here, an analysis of all multilateral treaties governing activities related to oceans is provided. A range of issues is examined including efficacy, geographic and taxonomic distribution, and other factors that facilitate or inhibit conservation. Since 1882, 103 countries have signed 265 multilateral treaties related to the management of marine resources. The majority of treaties (51%) deal with fisheries, 30% deal with pollution, 4% marine mammals and 15% deal with other topics. In terms of factors that may predict efficacy, 65% of marine treaties have secretariats, 50% have scientific mandates, and 13% have enforcement mechanisms; only 9% have all three. Given the context of the United Nations General Assembly's new commitment to manage human activity and its impact on common resources on the high seas, it is important to understand the strengths and weaknesses – individually and cumulatively – of existing binding marine agreements.

### 1. Introduction

Over the last half-century, the ‘tragedy of the commons’ has been an important concept for understanding the degradation of many common-pool resources, including marine fisheries, the global climate, and Antarctica [1–4]. However, the global commons are not as the name seems to imply, equally shared resources. The nature of the tragedy is such that while society benefits collectively in the long-term from cooperative action to protect a resource, individuals stand to gain more in the short-term by overexploiting it [1]. Consequently, over the last century, an increasing number of multilateral environmental agreements have been negotiated to govern human activity whose effects erode commons resources. World leaders have signed over 500 internationally recognized environmental agreements in the past five decades: 61 related to the atmosphere; 155 related to biodiversity; 179 pertaining to chemicals, hazardous substances, and waste; 46 land conventions; and 196 conventions related to water resource management [5]. After trade, environment is the most common area of global

rule-making [6].

Although the rapid growth of the number of environmental treaties may be seen as an encouraging sign of international commitment to protecting the environment, the declining state of the world's oceans [7–9] suggests that treaties are largely failing to fulfill their missions and achieve meaningful protection. ‘Treaty congestion’ – or the tendency of large numbers of treaties to overwhelm countries’ capacity to monitor, implement, and comply with new obligations – is a potential threat to marine conservation [10]. This congestion strains the organizational capacity of countries to handle the overlapping mandates, funding mechanisms, and distinct secretariats characteristic of these treaties. States with small governments or environmental budgets, in particular, may be unable to participate effectively in the many distinct fora. Perhaps the more troubling issue is that lack of coordination and energy behind these treaties risks turning the years of government negotiations into ‘empty treaties’ – those that look good on paper but do little to accomplish the stated objectives. A large number of uncoordinated agreements risks inconsistent obligations, overlapping

\* Correspondence to: Ocean Wise Conservation Association, PO Box 3232, Vancouver, BC, Canada V6B 3X8.

E-mail address: [Dalal.al-abdulrazzak@ocean.org](mailto:Dalal.al-abdulrazzak@ocean.org) (D. Al-Abdulrazzak).

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norms, gaps in coverage, and duplication (e.g., [11]). With respect to wildlife and ecosystem conservation, empty treaties may actually exacerbate the decline in vulnerable systems by giving stakeholder groups the incorrect impression that positive change is underway (e.g., in western and central Pacific fisheries management; [12]). The weight of existing treaty responsibilities on states and the individuals responsible for negotiation of agreements can also inhibit the will to develop new treaties, even where there is a clearly identified gap. For example, until the fall of 2015, there was reluctance to negotiate a legally binding agreement that organizes and comprehensively addresses the conservation of marine biodiversity on the high seas – a commons covering more than 40% of the Earth's surface. Finally, lack of enforcement means that compliant users bear the brunt of the cost of the collective benefit.

Regulating resource use in the oceans is especially difficult, as exploited wildlife and pollution can travel over long distances [13]. The vastness of the areas over which these rules must apply make them even more difficult to enforce, especially in the high seas, where a patchwork coalition of enforcement agencies is responsible for policing human activity in a place where they have no individual national authority. These factors have been shown to make conservation more difficult in the ocean than on land. For example, large geographic ranges do not buffer marine megafauna from extinction in the same way that they do on land, and the ranges of marine megafauna are 10 times larger on average and span four times as many countries [14]. Sixty percent of the ocean remains outside areas under national jurisdiction [15]. Furthermore, the international nature of marine resource extraction makes it difficult for individual States to rely solely on their domestic environmental regulation to address global issues, undermining their willingness to enact strict regulations that constrain their constituencies [13,16]. To this end, strong, enforceable, multilateral treaties are a necessary component of international marine conservation.

In July 2017, the members of the United Nations General Assembly (UNGA) finalized plans to negotiate a new agreement that will specifically target activity in areas beyond national jurisdiction, including the high seas [17]. Prior to this decision, international agreements governing human activities in the global commons have only had a peripheral focus on conservation or have had a stated purpose of managing resource extraction and/or pollution (e.g., regional fisheries management bodies that manage the extraction of transboundary or high-seas living marine resources). Given the context of UNGA's commitment to develop a new multilateral agreement to manage human activity and its impact on common resources on the high seas, it is important to understand the current structure of binding agreements with applications to the marine environment. Here, an analysis of such agreements is provided.

## 2. Methods

To better understand the existing patchwork of multilateral ocean

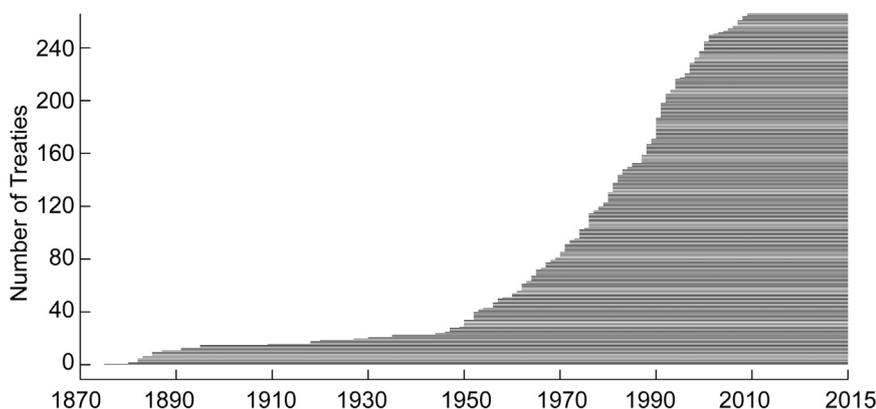


Fig. 1. Cumulative number of marine treaties by year entered into force.

treaties, a database of all binding multilateral agreements related to the use and management of marine resources is developed. Mitchell's [18] definition of international environmental agreement is applied to the marine environment as follows: a multilateral marine treaty is "an intergovernmental document intended as legally binding with a primary state purposes of preventing or managing human impacts on [marine] natural resources" [18]. Treaties regulating fisheries, conservation of biodiversity, protection of habitat and species, and other human activities impacting the marine environment such as mining and oil extraction were included. Other relevant treaties such as nuclear treaties and climate change were included if they have potential to impact the marine environment. Nonbinding treaties, bilateral treaties, soft law, and treaties related to human rights on the seas were considered beyond the scope of this study and therefore were not included.

A number of online treaty databases were consulted including the IUCN Environmental Treaty Status Data Set, The UN Treaty Collections, The International Environmental Agreements Database, The Ecolox Treaty Database, and the Fishbase Treaties and Conventions list. Information regarding the name, signatories, date of adoption, date entered into force, and major theme (fisheries, pollution, marine mammals, etc.) were compiled. Although there are many obstacles to analyzing agreement efficacy such as the lack of appropriate data or time scale [18] it was noted whether treaties had secretariats to provide reporting and coordination, scientific mandates requiring periodic expert review and assessment, and specific enforcement mechanisms to aid in implementation (e.g., compliance committees, boarding and inspection agreements, etc.). Although these three criteria were selected based on prior studies on effective environmental policy [19–23], and together were seen as a proxy to assess treaty 'efficacy', i.e., "whether the treaty solves the underlying problem" [19]. This, of course, is an oversimplification of the issue as it doesn't take into consideration the variation in characteristics of member states, the international context, and the underlying environmental problem, but it does serve as an important starting point. Finally, the range of taxonomic groups covered and geographic distribution across Large Marine Ecosystems (LME) and FAO Major Fishing Area (if applicable) were also examined.

## 3. Results and discussion

Since 1882, 103 countries have signed 266 multilateral treaties related to the management of marine resources (Fig. 1; Appendix A). The majority of treaties (51%) deal with fisheries, 30% deal with pollution, 4% deal with marine mammals and 15% deal with other topics. For treaties that were related to a specific taxonomic group, 72% were related to fish, 19% to mammals, 4% to turtles, 4% invertebrates and 1% algae. There is a wide range of infrastructure associated with marine treaties: 65% have secretariats, 50% have scientific mandates, and 13% have enforcement mechanisms; only 9% have all three (Table 1). Twenty-three treaties have none of these attributes, 80% of which are related to fisheries.

**Table 1**  
Ocean treaties that have secretariats, scientific mandates, and enforcement mechanisms.

Date entered into force	Treaty
1953–06–12	Protocol Amending The International Convention For The High Seas Fisheries Of The North Pacific Ocean
1969–03–21	International Convention For The Conservation Of Atlantic Tunas
1975–07–01	Convention On International Trade In Endangered Species Of Wild Fauna And Flora
1975–08–30	Convention On The Prevention Of Marine Pollution By Dumping Of Wastes And Other Matter
1982–03–17	Convention On Future Multilateral Cooperation In Northeast Atlantic Fisheries
1982–04–07	The Convention for the Conservation of Antarctic Marine Living Resources (1982)
1983–10–02	International Convention For The Prevention Of Pollution From Ships
1992–04–23	La Jolla Agreement On The Reduction Of Dolphin Mortality In The Eastern Pacific Ocean
1994–11–16	United Nations Convention On The Law Of The Sea
1997–12–14	Protocol Amending The International Convention For The Conservation Of Atlantic Tunas
2000–06–18	Protocol Concerning Specially Protected Areas and Wildlife to the Convention for the Protection and Development of the Marine Environment of the Wider Caribbean Region
2001–06–01	Agreement On The Conservation Of Cetaceans Of The Black Sea, Mediterranean Sea And Contiguous Atlantic Area
2003–04–13	Convention On The Conservation And Management Of Fishery Resources In The South East Atlantic Ocean
2003–08–08	Protocol On Fisheries To The Treaty Of The Southern African Development Community
2004–06–19	Convention on the Conservation and Management of the Highly Migratory Fish Stocks of the Western and Central Pacific Ocean
2005–03–10	Protocol Amending The International Convention For The Conservation Of Atlantic Tunas
2010–08–27	Convention For The Strengthening Of The Inter-American Tropical Tuna Commission Established By The 1949 Convention Between The United States Of America And The Republic Of Costa Rica
2012–08–24	Convention on the Conservation and Management of the High Seas Fishery Resources in the South Pacific Ocean
2015–07–19	Convention on the Conservation and Management of High Seas Fisheries Resources in the North Pacific Ocean
2016–06–05	Agreement on Port State Measures to Prevent, Deter and Eliminate Illegal, Unreported and Unregulated Fishing
2017–09–08	International Convention For The Control And Management Of Ships' Ballast Water And Sediments
Not in force	Protocol for the Protection of the Coastal and Marine Environment of the Western Indian Ocean from Land-based Sources and Activities to the Convention For The Protection, Management And Development Of The Marine And Coastal Environment Of The Eastern African Region
Not in force	Framework Agreement For The Conservation Of The Living Marine Resources Of The High Seas Of The South Pacific, "Galapagos Agreement"
Not in force	Agreement Creating The Eastern Pacific Tuna Fishing Organization

The timing of treaty development corresponds with global interest in each topic. The growing recognition of pollution as a threat to both environmental and human health in the 1970s [24] led to 24 new treaties in that decade (Fig. 1). Growth in the number of new fisheries treaties peaked in the 1990s with 34 new multilateral fishing agreements. This is perhaps not surprising, as the global peak (and subsequent decline) in global fisheries catches occurred during that same period [8]. Interest in marine mammals also peaked in 1990 with 4 new treaties (and none since). Fish (17%) followed by marine mammals (4%) are the most popular taxonomic group. This is likely due to their commercial value relative to other groups such as algae and invertebrates. The 1990s were the most prolific decade overall, with 69 new agreements related to the oceans (Fig. 1).

In terms of FAO Major Fishing Areas, the Northeast Atlantic (Area 27) had the highest number of treaties, followed by the Mediterranean and Black Sea Area (Area 37), and the Western Central Pacific (Area 71) with 55, 40, and 36 treaties respectively (Fig. 2a). While in terms of LME, the majority of treaties govern the Mediterranean and North Sea Large Marine Ecosystems (Fig. 2b). There are fewer treaties in the southern hemisphere than in the northern. France, followed by Norway and Denmark, has signed the most marine treaties with 97, 95, and 88 respectively (Fig. 3). This is a likely result of the high number of treaties negotiated for the temperate north Atlantic and the global nature of shipping and fishing fleets owned by European companies.

Despite the difficulty in States implementing the vast number of international marine agreements to which they are Party, some marine treaties have been effective in improving the status of marine mammals. One of the first successful multilateral environmental agreements was the North Pacific Fur Seal Convention of 1911, an agreement meant to mitigate the economic and environmental costs of overhunting, leading to an added benefit of contributing to a growth in fur seal and otter populations that has long been considered a success in early international efforts to conserve living marine resources [25,26]. Similarly, the International Convention for the Regulation of Whaling of 1946 originally had the objective of managing whale hunting as a fishery. However, this treaty has periodically allowed coalitions of conservationists and resource managers to achieve conservation wins for the

species under its jurisdiction. For example, in 1966, in the face of extremely low numbers of blue whales (*Balaenoptera musculus*), the international community banned commercial hunting for this species in the southern hemisphere [27]. In 1982, the ban on commercial whaling was extended to all of the whales managed under the jurisdiction of the treaty [27], and in 2016, several populations of one species of large whale (humpback whale, *Megaptera novaeangliae*) were removed from the United States' endangered species list.

Likewise treaties have been effective at reducing various kinds of marine pollution particularly from oil and ocean dumping [28]. According to the International Maritime Organization (IMO), which implements several marine pollution agreements, worldwide oil pollution from ships has decreased steadily since 1973 and unregulated dumping has largely stopped in recent decades [28,29]. Dumping of industrial wastes dropped from 17 million tonnes per year in the 1970s to 8 million tonnes per year in the 1980s [28], and is even lower today. The largest component of materials currently dumped at sea comes from sediment dredging, which are typically lower in chemical pollutants [29]. A recent, though yet untested, pollution treaty is the Minamata Convention on Mercury. Previous general, multilateral efforts to reduce chemical pollutants, while successful, did not adequately cover the specific issues leading to or stemming from mercury pollution. As a result of this recognition, the international community negotiated an agreement meant to protect human and environmental health from mercury released through human activities [30]. As of November 2016, this convention has been ratified by 35 States and will enter into force when that number reaches 50. The success of marine pollution treaties is most likely related to highly visible and dramatic environmental problems receiving the most attention [18].

Finfish extraction treaties, especially those that founded Regional Fisheries Management Organizations (RFMOs), have not been as effective. Cullis-Suzuki and Pauly (2010) assessed the overall performance of RFMOs as determined by how well they achieved their management and conservation objectives, and found that two-thirds of fish stocks on the high seas and under RFMO management were either overfished and/or depleted, matching estimates described by FAO [31]. Despite years or decades of management under multilateral treaties,

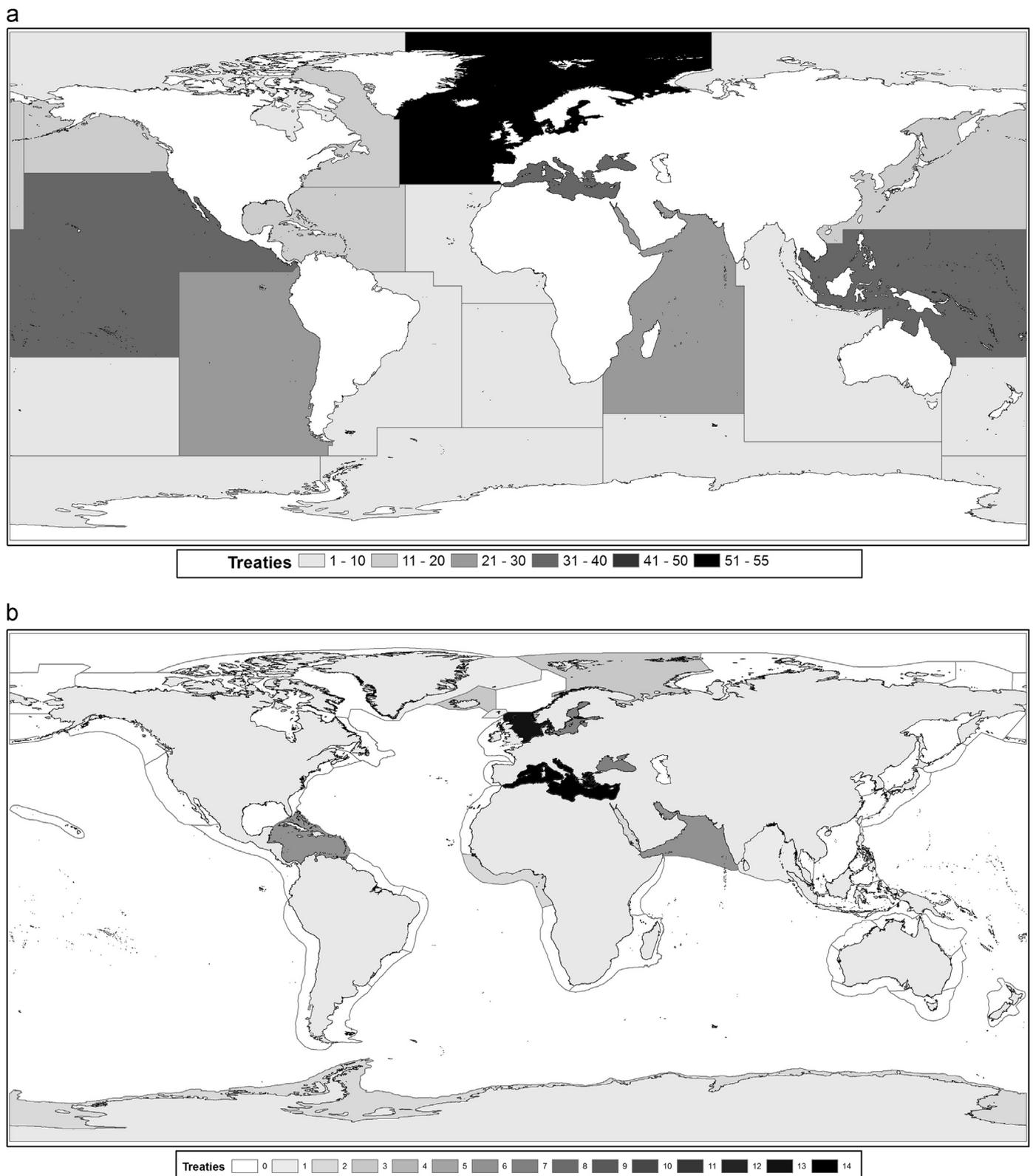


Fig. 2. Distribution of marine treaties by (a) FAO Major Fishing Area and (b) Large Marine Ecosystem (LME).

several stocks continue to decline. The Pacific Bluefin Tuna and the Mediterranean Swordfish are two stocks, in particular, that have declined dramatically from historical levels [32,33]. As of 2016, managers have continued to allow overfishing to occur and have implemented ‘recovery plans’ with little or no chance of success, despite advice from their own scientific bodies. While the mammal-focused conservation

stories described above may not be totally applicable to other fisheries resources, lessons learned (e.g., alignment of conservation and economic priorities, consideration of positions favored by conservation-minded constituencies, and regular meetings of an officially sanctioned conservation committee) should be applied at RFMOs that primarily manage fisheries targeting tunas, salmons, and other finfishes and

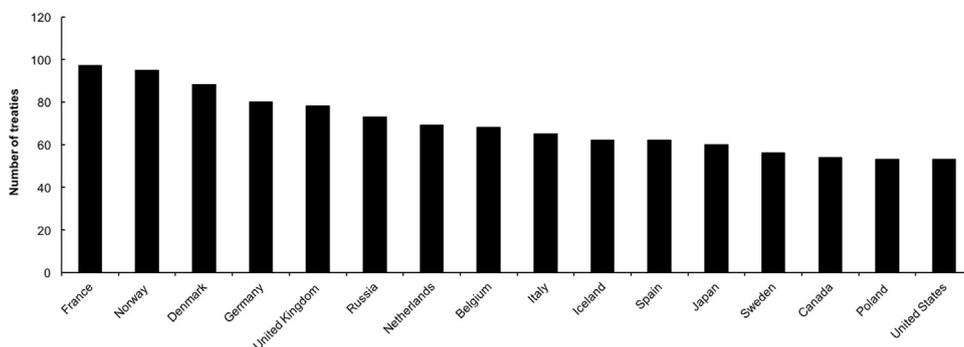


Fig. 3. Top countries signatory to marine treaties.

sharks.

Across all three types of treaties, the lack of enforcement mechanisms is worrisome. Only 34 treaties (13%) have specific enforcement mechanisms, and of these, 43% are found in fisheries treaties, 27% pollution treaties, 11% in marine mammal treaties, and 18% in other treaties. Typically, States are responsible for determining whether or not they are in compliance with obligations set out under the various international agreements they have signed [34]. Some treaties are unenforceable in practice, notably because obligations are vague, there are no clear penalties for violations, and/or penalties in place do not outweigh the risk of getting caught [34]. Furthermore, existing measures within some treaties may be difficult to enforce due to the limited budgets and manpower allocated by States [35]. Improvement in the enforcement of and compliance with conservation measures defined in multilateral treaties would help reduce the ‘empty treaty’ phenomenon and improve the status of marine species and ecosystems in the face of human activity. Moreover, with the Agreement on Port State Measures to Prevent, Deter and Eliminate Illegal, Unreported and Unregulated Fishing (PSMA)– a foundational agreement meant to prevent illegally exploited fisheries resources from entering the global marketplace – coming into force in 2016 [36], the number of enforcement mechanisms should increase (e.g., [37]).

While in some cases increasing enforcement will likely lead to better outcomes, other treaties are ineffectual and better abandoned. For example, the 2016 Agreement on Cooperation on Marine Oil Pollution, Preparedness and Response in the Arctic is meant to coordinate cleanup responsibilities in case of an oil spill, but the agreement proposes no actual requirements in terms of drilling safeguards or capacities to deal with oil spills. It also makes no mention of prevention measures, leaving individual states to establish their own drilling standards, liability limits, and impose oil pollution cleanup. In essence, this treaty carries little meaning besides saying that Arctic nations will do their best to clean up spills after they occur.

#### 4. Conclusions

The current treaty regime governing the oceans is vast, with the majority of agreements being negotiated and adopted in the last four decades as a reaction to environmental crises, rather than carefully coordinated efforts aimed at conserving and protecting marine biological diversity [38]. Although much of this structure is meant to combat the tragedy of the commons, sovereignty entitles States to choose to participate or not. Thus, successful international cooperation depends on whether the States most heavily involved in the activities being managed join the bodies doing the management and whether or not ‘free-riding’ can be deterred [39,40]. Even when all the right States participate, it is important that the efforts are effective and efficient.

As demonstrated with the above examples, four general areas that could provide opportunities for marine conservation through multilateral treaties include: 1) continuing the heretofore successful implementation of pollution treaties; 2) expanding and implementing the conservation mandate of fishing treaties, as has been accomplished in

some marine mammal hunting agreements; 3) identifying and improving conservation treaties that lack enforcement or compliance mechanisms in order to prevent the drag of ‘empty treaties;’ and 4) negotiating broad agreements meant to mitigate confusion and/or fill gaps associated with overlapping (both thematically and geographically) or missing mandates of other treaty-based international organizations. The ongoing effort to negotiate a new agreement on the conservation and sustainable use of the high seas falls into this last general category. Efforts to address ocean acidification [41] or destructive fishing subsidies [42] would as well.

A new high seas instrument should take into account that enforcement mechanisms, secretariats, and scientific committees have not been systematically integrated into ocean treaties, despite numerous studies highlighting the importance of these criteria to effective environmental policy [19–23]. The strictness of enforcement measures is often dependent on the economic benefits that could be gained through non-compliance [21], which in the case of the high seas will be great because it is easier to escape unnoticed in ABNJ than in national waters. A new instrument should therefore, have suitably strict enforcement measures, including greater fines, to deter noncompliance. In addition, the lack of scientific mandates in ocean treaties systematically interferes with realization of the precautionary and/or ecosystem approach in marine management. The knowledge base for the high seas is arguably weaker than for other marine ecosystems, but should not be used as grounds for inaction. Finally, despite the increased secretariat workloads, this criterion should not be overlooked, and instead streamlining processes such as allowing a secretariat from one agreement to officially submit proposals to another or the development of a best practices framework should be considered [23].

The existing network of treaties related to the high seas should also be taken into account so that the linkages and trade-offs between international environmental problems covered under different agreements are considered [43]. For example, fisheries treaties have historically been weaker than marine pollution or marine mammal treaties, so that despite the majority of ocean treaties being concerned with fisheries (51%), they tend to be less effective. These important insights could lead to inter-agreement cooperation [23].

As current demand for ocean resources outpaces the ocean’s ability to replenish itself, an efficient and effective network of multilateral agreements is an important tool for marine conservation and for the billions of people who directly benefit from healthy oceans. Improved governance will play a crucial role in halting the current deterioration of marine ecosystems and in developing a sustainable future for coastal and marine economies. Effective implementation of active treaties, better compliance and strengthened enforcement of existing measures, and targeted development of new agreements can all help correct some of the ongoing challenges in ocean conservation.

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## Appendix A. Supporting information

Supplementary data associated with this article can be found in the online version at <http://dx.doi.org/10.1016/j.marpol.2017.09.036>.

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