

Protecting Earth's last conservation frontier: scientific, management and legal priorities for MPAs beyond national boundaries

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ABSTRACT

1. Marine areas beyond national jurisdiction (ABNJ) comprise most of Earth's interconnected ocean, hosting complex ecosystems that play key roles in sustaining life and providing important goods and services.

2. Although ABNJ encompass nearly half the planet's surface, biological diversity found in these areas remains largely unprotected. Mounting pressures generated by the escalation of human activities in ABNJ threaten vital ecosystem services and the fragile web of life that supports them.

3. Marine protected areas (MPAs) are widely acknowledged as an important tool for the conservation of biological diversity. Currently less than 1% of ABNJ are protected, with the vast majority of MPAs located in waters within national jurisdiction.

4. The existing legal framework for protection and sustainable use of ABNJ lacks common goals, principles or standards, multi-sectoral coordination and comprehensive geographic coverage to ensure conservation or good governance grounded in science-based decision-making, transparency, accountability and effective enforcement.

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5. This paper highlights the urgency and importance of protecting the last conservation frontier on Earth. Key lessons for conservation in ABNJ can be learned from regional, cross-boundary and national experiences shared during the high seas governance workshop at the IUCN World Parks Congress in Sydney, Australia in November 2014.

6. The intent of this paper is to inform the deliberations now underway in the United Nations General Assembly to develop a new legally binding international instrument for the conservation and sustainable use of marine biological diversity in ABNJ. It also aims to encourage further initiatives to protect and preserve our last conservation frontier using currently available mechanisms and powers consistent with international law.

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INTRODUCTION

Marine areas beyond national jurisdiction (ABNJ), comprising the high seas water column¹ and seabed Area,² encompass over 60% of Earth's global ocean. These regions host complex natural systems that play key roles in sustaining life on the planet and provide vital ecosystem services (Rogers *et al.*, 2014).³ Marine biological diversity is composed of an intricate web of genes, species and habitats that is critical to maintaining the benefits derived from healthy ecosystems (Millennium Ecosystem Assessment, 2005; Cardinale *et al.*, 2012). ABNJ have also played an important role in the cultures of seafaring peoples, who for millennia used high seas marine resources to sustain them both physically and spiritually (Buck, 1938; Malo, 1951).

Mounting pressures generated by the escalation of human activities in ABNJ threaten the existence of these crucial ecosystems and the web of life that supports them. Overfishing and destructive fishing

practices, marine and land-based pollution and debris, seabed mining, underwater noise and the consequences of increasing CO₂ emissions such as ocean warming, deoxygenation and acidification are some of the documented threats (Rogers and Laffoley, 2011; Van Dover, 2014). The conservation and sustainable use of ABNJ is among the most critical and difficult challenges facing the international community today.

Marine protected areas (MPAs) are widely acknowledged as an important tool for biological diversity conservation (see, for example, Edgar *et al.*, 2008; Howell *et al.*, 2010; Johnson *et al.*, 2014). The international community is increasingly calling for the establishment of MPAs covering large portions of the ocean, including in ABNJ. Outcomes of the 2002 World Summit on Sustainable Development (WSSD) encouraged States to develop 'MPAs consistent with international law and based on scientific information including representative networks by 2012' (Johannesburg Plan, 2002). In 2010 the Parties to the Convention on Biological Diversity (CBD, 1992) adopted Aichi Target 11 challenging States to conserve at least 10% of coastal and marine areas through systems of protected areas and other effective conservation measures by 2020 (UNEP, 2010). This goal was endorsed in the outcome document 'The Future We Want' (A/RES/66/288), which was agreed in 2012 at the UN Summit on Sustainable Development in Rio de Janeiro, Brazil (Rio+20) and subsequently adopted by a United Nations (UN) General Assembly resolution (A/RES/67/203).

¹The 'high seas' are defined as 'all parts of the sea that are not included in the exclusive economic zone, in the territorial sea or in the internal waters of a State, or in the archipelagic waters of an archipelagic State.' United Nations Convention on the Law of the Sea (UNCLOS) art. 86.

²The Area is defined as 'the seabed and ocean floor and subsoil thereof, beyond the limits of national jurisdiction' UNCLOS art. 1(1).

³Ecosystem services include supporting two thirds of the world's commercially important fisheries during some phase of their life history, regulating the planetary climate, generating nearly 50% of atmospheric oxygen, and providing habitat for untold numbers of marine organisms (UNEP, 2007; Global Ocean Commission, 2014; Laffoley *et al.*, 2014).

Scientists have long argued that significantly more than 10% of the ocean must be safeguarded to ensure the maintenance of healthy marine ecosystems (Gerber *et al.*, 2003). There is widespread interest among nations to increase the target for ocean areas under protection, most notably to the 30% goal adopted at the 2014 International Union for Conservation of Nature (IUCN) World Parks Congress in the Promise of Sydney outcome document.⁴ With less than 1% of ABNJ currently protected (Juffe-Bignoli *et al.*, 2014; Thomas *et al.*, 2014), establishing MPAs on the high seas and in the Area will be central to any genuine opportunity to achieve this conservation target. Participants in the Marine Cross-Cutting Theme at the World Parks Congress also called upon States, international organizations, businesses, communities and civil society to:

... urgently increase the ocean area that is effectively and equitably managed in ecologically representative and well-connected systems of MPAs or other effective conservation measures. This network should target protection of both biological diversity and ecosystem services and should include at least 30% of each marine habitat. The ultimate aim is to create a fully sustainable ocean, at least 30% of which has no-extractive activities (IUCN, 2014).

Taking into account the IUCN Promise of Sydney recommendation, the urgent challenge now faced by the international community is how to achieve 30% MPA coverage and protect the ocean in time to achieve 'The Future We Want.'

Barriers to protecting biological diversity in ABNJ

The current governance regime for ABNJ is an important factor hindering the effective protection of ABNJ including the establishment of MPAs beyond national boundaries. The existing system lacks the common goals, principles or standards, multi-sectoral coordination, geographic coverage and accountability frameworks needed to ensure comprehensive conservation, enforcement or

broad stakeholder participation (Gjerde *et al.*, 2008b; Ban *et al.*, 2013a).⁵

The present management organizations with authority in ABNJ are each concerned with regulating a specific sector, leading to an institutional landscape that is fragmented and uncoordinated.⁶ Some of the organizations incorporate initiatives that relate to the protection of the marine environment,⁷ however, the sectoral activities are managed individually and in isolation with limited consideration for their cumulative or synergistic impacts or the need for coordinated, connected and comprehensive conservation (Ban *et al.*, 2013a; Druel and Gjerde, 2014). There are also clear gaps in geographical coverage, as regional agreements and mandates to protect marine biological diversity only cover a small portion of ABNJ (Warner *et al.*, 2013).

The seeds of future MPA networks in ABNJ are formed by existing measures in the Southern Ocean, the north-east Atlantic Ocean, the Pacific Ocean and the Mediterranean Sea⁸ (Figure 1), but there is no single global instrument that allows for the coordinated implementation of MPAs in ABNJ (Gjerde and Ruska-Domino, 2012; Reeve *et al.*, 2012; Ban *et al.*, 2013a). This leaves significant gaps and shortfalls in achieving the Promise of Sydney of protecting at least 30% of each marine habitat type.

The United Nations Convention on the Law of the Sea (UNCLOS) was hailed as the constitution for the oceans at the time of its conclusion in 1982 (Koh,

⁵Ban *et al.* (2013a) define *comprehensive* to mean benefiting from management that is ecosystem-based, integrated and systematic, with spatial and non-spatial measures and coordinated science to inform management decisions. Key components and benefits of systematic approaches to conservation planning, compared with sector-specific or ad hoc approaches, include transparency (e.g. defined goals, explicit analyses of data, quantitative objectives), inclusiveness (e.g. engaged stakeholders, consideration of known elements of biological diversity), integration (e.g. complementarity of selected areas and actions, spatial connectivity) and efficiency (e.g. costs to users and implementers are minimized) (Margules and Pressey, 2000; Pressey, 2007; Pressey and Bottrill, 2009; Ban *et al.*, 2013b).

⁶Examples of management organizations with authority in ABNJ include regional fisheries management organizations (RFMOs), the International Whaling Commission (IWC), the International Maritime Organization (IMO) and the International Seabed Authority (ISA) (Ardron *et al.*, 2014).

⁷Examples include: the International Seabed Authority Areas of Particular Environmental Interest (APEIs); see *infra*.

⁸These measures are the CCAMLR, OSPAR Convention, Noumea Convention and Protocol for Specially Protected Areas and Biological diversity in the Mediterranean Sea.

⁴The Promise of Sydney, IUCN World Parks Congress 2014, Sydney, Australia, http://worldparkscongress.org/about/promise_of_sydney.html

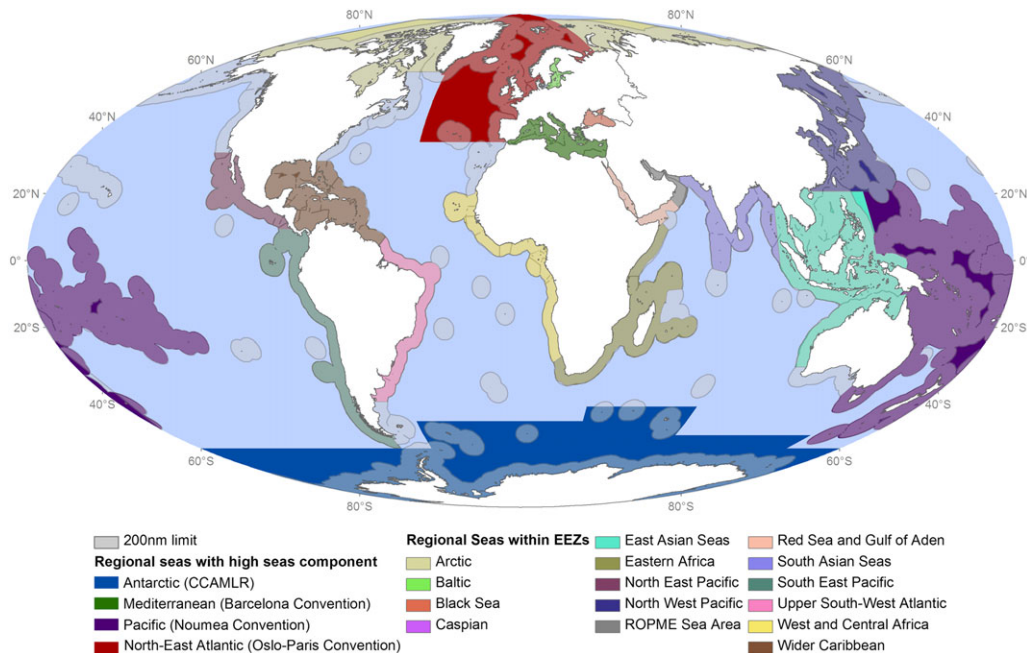


Figure 1. Regional Seas Conventions and Action Plans with and without a mandate for ABNJ protection. (Source: Ban *et al.*, 2013a.)

1982). The opening preamble clearly articulates the driving impetus for UNCLOS as ‘the desire to settle, in a spirit of mutual understanding and cooperation, all issues relating to the law of the sea.’ The preamble also recognizes the importance of ocean conservation with the objective of creating ‘a legal order for the seas and oceans which will [...] promote the equitable and efficient utilization of their resources, the conservation of their living resources, and the study, protection and preservation of the marine environment...’ (UNCLOS, 1982).

When UNCLOS was drafted, however, anthropogenic impacts in ABNJ were not occurring at the alarming levels they have reached today. Access to the deep sea was limited and threats to the marine ecosystem health and biological diversity from climate change and ocean acidification were largely unknown, as was the need for building ocean ecosystem resilience to mitigate adverse effects. Key conservation concepts, principles and tools such as biological diversity, precaution, ecosystem-based approaches and MPAs were not part of the global conservation lexicon until 10 years later with the adoption of Agenda 21 at the UN Conference on Environment and Development (UNCED) and the

negotiation of the CBD (Gjerde, 2012). Although UNCLOS appeared comprehensive at the time of its negotiation, important governance gaps and weaknesses have become apparent over the years, especially with regard to the protection of marine biological diversity in ABNJ (Gjerde *et al.*, 2008a; Hart, 2008).

Toward a new legally-binding instrument under UNCLOS

Worldwide, leaders are increasingly recognizing the importance of protecting marine biological diversity in ABNJ. In June 2015 member States of the UN General Assembly (UNGA) formally agreed to develop a legally-binding instrument under UNCLOS for the conservation and sustainable use of marine biological diversity in ABNJ (UNGA, 2015).⁹ This decision builds on more than a decade of global discussions and debates at the UN, CBD Conferences of the

⁹UNGA/RES/69/292, Development of an international legally binding instrument under the United Nations Convention on the Law of the Sea on the conservation and sustainable use of marine biological diversity of areas beyond national jurisdiction, adopted 19 June 2015. <http://daccess-dds-ny.un.org/doc/UNDOC/GEN/N15/138/14/PDF/N1513814.pdf?OpenElement>

Parties, IUCN Congresses and other international fora.¹⁰

The overall aim of a new legally-binding instrument is the conservation and sustainable use of biological diversity, providing an important opportunity to address governance gaps and weaknesses hampering the effective stewardship of nearly two thirds of the ocean. A global mechanism is required for the establishment of effective networks of MPAs and other area-based management tools that are science-based and grounded in key principles such as biological diversity protection, precaution and ecosystem approaches (Ban *et al.*, 2013a). Support for coordinated scientific research and monitoring will be essential to provide the basis for global and regional conservation and management efforts (Gjerde *et al.*, 2008a). A systematic approach to MPA network creation needs to be established and operationalized.¹¹

The next steps for the UNCLOS process include four 10-day Preparatory Committee (PrepCom) meetings to take place in 2016 and 2017. Among other things, the PrepCom negotiations will address the four elements identified in the 2011 'package deal': marine genetic resources, including

questions on the sharing of benefits; measures such as area-based management tools including MPAs; environmental impact assessments; and capacity building and the transfer of marine technology.¹² By September 2018, the UNGA will decide whether to convene an intergovernmental conference to finalize the treaty text, and if so, a starting date.

REGIONAL, CROSS-BOUNDARY AND NATIONAL CONSERVATION EXPERIENCES RELEVANT TO ABNJ

Fresh opportunities and challenges will arise as the UNGA negotiates a new legally-binding instrument under UNCLOS and States strive to achieve effective conservation measures in a timely, systematic, coordinated and enforceable manner. Regional, cross-boundary and national conservation experiences shared by participants at the 2014 IUCN World Parks Congress can inform these discussions.

Current regional agreements with mandates in ABNJ

UNCLOS emphasizes the requirement of State cooperation at global and regional levels for the protection and preservation of the marine environment.¹³ Regional approaches have many acknowledged advantages for conservation: (1) the implementation of customized management for specific marine ecosystems; (2) cooperation in the development of shared scientific knowledge and the trial of innovative management tools; and (3) the ability to advance global standards, at least

¹⁰The UN established the Ad Hoc Open-ended Informal Working Group to Study Issues Relating to the Conservation and Sustainable Use of Marine Biological Diversity Beyond Areas of National Jurisdiction (BBNJ Working Group) that met from 2006 to 2014. In 2012 the UN Summit on Sustainable Development adopted a process to negotiate a decision on whether to launch a new legally-binding instrument (Kohona and Lijnzaad, 2015; Rochette *et al.*, 2015a; UNGA, 2015). See more generally <http://www.un.org/depts/los/biodiversityworkinggroup/biodiversityworkinggroup.htm>; and <https://www.cbd.int/marine/decisions.shtml>; WCC 2000 Res-2.20 Conservation of marine biodiversity. <https://portals.iucn.org/library/sites/library/files/documents/WCC-2nd-002.pdf>, at pp. 23–24; WCC-2004-Res-3.064 Conservation and sustainable management of high-seas biodiversity <https://portals.iucn.org/library/sites/library/files/documents/WCC-3rd-004.pdf> at pp.71–73; WCC 2008 Res-4.031 Achieving conservation of marine biodiversity in areas beyond national jurisdictions <https://portals.iucn.org/library/efiles/documents/WCC-4th-005.pdf> at pp. 33–35; WCC-2012-Res-074-EN Implementing conservation and sustainable management of marine biodiversity in areas beyond national jurisdiction; <https://portals.iucn.org/library/sites/library/files/documents/WCC-5th-005.pdf> at pp. 101–104.

¹¹Systems of MPAs include areas of ecological or biological significance as well as sites that are representative of species or habitats in a particular biogeographic region. Such sites, according to the CBD design criteria, should also address issues of connectivity, be adequate in size to be viable, and be replicated (CBD Guidance for designing representative networks of MPAs, CBD COP Decision X/20/Annex II).

¹²In 2011, within the BBNJ Working Group, a 'deal' was brokered primarily between the EU and the G77+China that any process going forward to develop a new instrument would include these four elements (as outlined in the main text) and be considered 'together and as a whole'. This means that nothing can be considered agreed on one element until agreement could be reached on all the other elements. Together these elements are referred to as 'the package' and form the basis for the negotiation of a legally-binding instrument under UNCLOS for the conservation and sustainable use of marine biological diversity in ABNJ.

¹³'States shall cooperate on a global basis and, as appropriate, on a regional basis, directly or through competent international organizations, in formulating and elaborating international rules, standards and recommended practices and procedures consistent with this Convention, for the protection and preservation of the marine environment, taking into account characteristic regional features.' (UNCLOS art. 197)

with respect to the regional actors willing to be bound by them (Rochette *et al.*, 2014a; see also Rochette *et al.*, 2015b).

Four marine spaces are covered by existing regional agreements with specific mandates in ABNJ: the Mediterranean Sea (Barcelona Convention, 1976), the Southern Ocean (Antarctic Treaty, 1959; CCAMLR, 1980), the North-East Atlantic (OSPAR Convention, 1992) and the South Pacific Region (Noumea Convention, 1986) (Figure 1). Apart from the South Pacific Region, the three other regions have already established MPAs in ABNJ.

The Pelagos Sanctuary for Marine Mammals was created in the Mediterranean Sea, in 1999 by France, Italy and Monaco (Accord Méditerranée, 1999). The Sanctuary incorporates the territorial waters of the three Parties as well as the adjacent water column outside their national jurisdictions¹⁴ and was recognized as a Specially Protected Area of Mediterranean Importance (SPAMI) in 2001 (Notarbartolo di Sciara *et al.*, 2008). A joint management plan was approved in 2004 and additional steps have been taken to improve the protection of marine mammals in the area (Mangos and André, 2008; Notarbartolo di Sciara, 2009; Mayol *et al.*, 2013).

Contracting Parties to the OSPAR Convention in the North-east Atlantic established a network of six MPAs in ABNJ in 2010 (OSPAR Commission, 2011; see also Molenaar and Elferink, 2009; O'Leary *et al.*, 2012; Freestone *et al.*, 2014). OSPAR adopted a seventh MPA in 2012 (OSPAR Commission, 2013) and have also adopted guidelines for the management of the MPAs (OSPAR Commission, 2012).

The OSPAR Commission has developed a 'collective arrangement between competent international organizations on cooperation and coordination regarding selected areas in ABNJ' (Collective Agreement, 2014) to improve cooperation; the Collective Agreement is underpinned by more formal Memoranda of Understanding (Johnson, 2013). Although not a legally binding instrument, this arrangement seeks to foster cooperation in the

development and implementation of management measures. Only the OSPAR Commission and the North East Atlantic Fisheries Commission have endorsed the Collective Arrangement to date.¹⁵

In 2009 the Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR) adopted scientific guidance to fulfil international commitments to establish a coherent and representative network of MPAs by 2012. That year CCAMLR also established its first MPA on the South Orkney Islands continental shelf (CCAMLR, 2009). A 2011 scientific workshop addressed additional MPA proposals (CCAMLR, 2011a)¹⁶ and adopted a general framework for their designation (CCAMLR, 2011b). Despite more than five years of negotiations, the Commission has failed to reach agreement on the designation of two new large MPAs in the Southern Ocean (CCAMLR, 2015). Although the majority of members support the MPAs, a small number of States have raised objections based on conflicting interpretations of the CAMLR Convention's conservation mandate and allowing for 'rational use' of living resources (Jacquet and Brooks, 2015). Further objections have included the duration and scale of the proposed MPAs, as well as a lack of robust research and monitoring plans and available science to support the objectives of the MPAs (Brooks, 2013). As CCAMLR operates by consensus, these proposals have not been approved to date (CCAMLR, 2015). Beyond the existing proposals, two additional large MPAs are also in development for consideration as early as 2016.

It should be noted that the International Seabed Authority (ISA), while a global body, has adopted a regional-scale environmental management plan for the Clarion-Clipperton Fracture Zone in the

¹⁴Due to the size of the Mediterranean Sea, no point is located more than 200 nm from the closest land or island. ABNJ would therefore disappear if all coastal States established EEZs (Notarbartolo-di-Sciara *et al.*, 2008).

¹⁵Although promising, this process has required intensive time and labour commitments, particularly in the global bodies such as the International Maritime Organization (IMO) and International Seabed Authority (ISA) (Freestone *et al.*, 2014). Progress has been slow for many reasons including: (1) some sectoral organizations have yet to integrate biological diversity conservation, precaution or ecosystem-based considerations into their decision-making processes; and (2) some States do not recognize the legitimacy of regional initiatives (Gjerde, 2012).

¹⁶Work to develop MPAs within the 11 previously identified priority areas was still encouraged.

Eastern Pacific Ocean. The ISA is mandated under UNCLOS to administer 'on behalf of all humankind' deep seabed mining (DSM) in 'the Area' beyond national jurisdictions (UNCLOS Articles 135, 157(1)). In 2012, the ISA passed its first environmental management plan for the Clarion-Clipperton Zone. This included the designation of a network of nine Areas of Particular Environmental Interest (APEIs), based on scientific recommendations for systems of representative protected areas originating from a 2007 workshop (Lodge *et al.*, 2014). The management plan is to be reviewed in 2016. A new agreement would not necessarily affect this ISA process other than to encourage the ISA to expand its efforts into additional regions of mining interest, and to enhance the ability of Parties to seek complementary protective measures from activities beyond seabed mining.

Emerging regional initiatives

Growing awareness of the need to promote protection is spurring a variety of innovative partnerships and projects in the Sargasso Sea, the South-west Indian Ocean and the South-east Pacific Ocean.¹⁷

Sargasso Sea

The Sargasso Sea Commission was established by the 2014 Hamilton Declaration on Collaboration for the Conservation of the Sargasso Sea¹⁸ (Freestone and Morrison, 2014; Morrison and Freestone, 2014) to exercise a stewardship role for this unique *Sargassum*-based ecosystem in ABNJ.¹⁹ Led by the Government of Bermuda, it

built upon the work of the Sargasso Sea Alliance, a partnership among the Government of Bermuda, non-governmental organizations (NGOs), scientists and private donors, launched in 2010. Its overarching aims are to promote international recognition of the ecological and biological significance of the Sargasso Sea and to promote protection measures for it using existing international and regional organizations. These include the regulation of fishing impacts through the International Commission for the Conservation of Atlantic Tunas (ICCAT) and the North Atlantic Fisheries Organization (NAFO); the regulation of vessel-based pollution and other shipping impacts through the International Maritime Organization (IMO)²⁰; coordination with the ISA on seabed exploration and mining issues; and coordination with industry associations and scientific organizations (Freestone and Bulger, 2016). There is neither a regional marine environmental agreement for the Sargasso Sea nor a regional fisheries management organization (RFMO) for the bulk of the Sargasso Sea south of the NAFO area other than ICCAT, which only applies to tuna and tuna-like species. (Freestone and Morrison, 2014).²¹ In 2012, the Parties to the CBD recognized the Sargasso Sea as an 'ecologically or biologically significant area' (EBSA) (UNEP, 2012).²²

Indian Ocean and Pacific Ocean

In the south-west Indian Ocean (SWIO), IUCN is leading a three-year project to explore the conservation and sustainable use of seamount and hydrothermal vent ecosystems in ABNJ. The study focuses on major threats to habitats from

¹⁷It is also worth noting that in Western Africa, Contracting Parties to the Abidjan Convention (1981) adopted a decision in 2014 requesting the Secretariat to set up a working group to study conservation and sustainable use of biological diversity in ABNJ. Moreover, the Member States of the Permanent Commission for the South Pacific (CPPS) signed the Galapagos Commitment in August 2012 in which they committed to promote coordinated action in the Southeast Pacific 'regarding their interests in living and non-living resources in ABNJ'.

¹⁸For text see Freestone and Morrison (2014) at pp. 355–362. The government signatories are Bermuda, Azores, Monaco, the UK and the USA. Five international and regional organizations also participated as Observers: OSPAR, ISA, the Inter-American Convention for the Conservation of Atlantic Sea Turtles, the Convention on Migratory Species, and IUCN.

¹⁹The Sargasso Sea covers over 4 million km².

²⁰IMO measures might include vessel routing measures, discharge restrictions or even the designation of a Particularly Sensitive Sea Area (PSSA) with associated protection measures.

²¹The regulatory area of NAFO overlaps slightly with Sargasso Sea.

²²In 2008, the ninth Conference of the Parties to the CBD adopted seven criteria for the identification of 'ecologically or biologically significant marine areas' (EBSAs) in need of protection along with scientific guidance for designing representative networks of MPAs (UNEP, 2008). In 2010, the Tenth Conference of Parties to the CBD launched a series of regional expert workshops to describe areas that meet the EBSA criteria (Dunn *et al.*, 2014). Information on areas described as meeting the EBSA criteria by these workshops and reviewed by subsequent COPs is now available on a dedicated CBD website: <https://www.cbd.int/ebsa/>

overexploitation, alteration and destruction by deep-sea fishing and mining. The project also seeks ways to draw the attention of coastal countries to ABNJ by using existing legal instruments (Rochette and Wright, 2015).

As part of a five-year programme through the Food and Agriculture Organization of the UN (FAO) and the UN Environment Programme (UNEP) that is funded by the Global Environment Facility (GEF), UNEP's World Conservation Monitoring Centre (UNEP-WCMC) is undertaking an initiative to test how existing area-based planning tools could be applied to ABNJ deep-sea conservation and sustainable resource use. The project will draw upon lessons from regional experiences and apply them, as appropriate, to two pilot areas, the Western Indian Ocean and the South-east Pacific Ocean in collaboration with the relevant regional agreements, the Nairobi Convention (1985) and the Permanent Commission for the South Pacific.

Lessons from regional experiences

Regional experiences in the North-east Atlantic, the Southern Ocean and the Sargasso Sea highlight a number of challenges that can be considered in the development of a new UNCLOS legally-binding instrument for ABNJ. First, to address the significant governance gaps in coverage under regional seas organizations in areas such as the Sargasso Sea – and indeed most of the Atlantic Ocean and large parts of the Pacific, Indian and Arctic Oceans (Ban *et al.*, 2013a) – existing sectoral organizations such as the IMO, ISA and RFMOs will need to be motivated to use existing powers and expand their mandates where necessary to adopt area-based management measures specifically to protect biological diversity in ABNJ from activities under their competence. The information gathered in the CBD repository describing locations that meet the EBSA criteria already indicates a broad range of areas that would benefit from additional protection. New or expanded regional seas organizations may be required to fill the geographic gaps.

Second, although several regional bodies have established MPAs outside national boundaries, these are only directly binding on their Contracting Parties. Further support is therefore needed to enable these

regional initiatives to gain recognition and endorsement at the global level (Rochette *et al.*, 2014b). Third, a new legally-binding instrument must clarify and elaborate the duty to cooperate enshrined in UNCLOS, for example by supporting conservation measures and governance principles agreed to under the new instrument accompanied by reporting requirements. Fourth, additional financial resources are urgently needed for regional conservation initiatives (Rochette *et al.*, 2015b). Finally, since regional conservation bodies such as OSPAR in the North-east Atlantic generally lack mandates for the regulation of various activities, including fishing, navigation and seabed mining, mechanisms to inspire and impel cooperation among global and regional organizations are essential (Ardron *et al.*, 2014).

Cross-boundary experiences

Experiences in the Costa Rican Thermal Dome and the continental shelf off Portugal illustrate the complexities of coordinating conservation efforts across national boundaries and ABNJ that must also be considered as part of a new legally-binding instrument.

Costa Rican thermal dome

The Costa Rican Thermal Dome is a dynamic marine feature that is located mainly in ABNJ but that also periodically straddles the exclusive economic zones²³ (EEZ) of Costa Rica, Nicaragua, El Salvador, Guatemala and Mexico (Fiedler, 2002; Kessler, 2006). Currents and wind patterns generate an area of high productivity that sustains a complex food web of economic importance to fisheries such as tuna and squid. Endangered blue whales travel thousands of kilometres to breed and feed in the waters of the Dome, and other species that are important for tourism in nearby coastal areas also forage in the area, including dolphins, billfish and leatherback turtles (Mate and Lagerquist, 1999; Bailey *et al.*, 2008). The remote region is threatened by many factors including impacts from commercial shipping and unregulated fishing, however, the dynamic and

²³The exclusive economic zone (EEZ) is governed under UNCLOS articles 55–75.

multi-jurisdictional nature of the Dome has made the development and implementation of governance measures particularly difficult.

Portuguese MPAs

In the Atlantic Ocean, Portugal has instituted five MPAs on the continental shelf²⁴ claimed by Portugal beyond the 200 nautical-mile (nm) limit of its EEZ. The MPAs were established in 2007 to protect a hydrothermal vent field and in 2010 to protect four areas of seamounts. Portuguese protection for the seamounts is complemented by MPAs that have been designated by OSPAR for the high seas water column above Portugal's claimed extended continental shelf. Coordination is politically challenging due to the dual national and international legal and institutional systems involved (Ribeiro, 2014). National measures to protect the sea bed are not necessarily binding on industry activities affecting the high seas water column above. Also any protective measures adopted under OSPAR, NEAFC or the European Union are applicable only to the Contracting Parties or Member States and their nationals. There is an additional complication due to the growing interest in seabed mining and the fact that the rights and obligations regarding potential mining impacts on the high seas water column from activities on the outer continental shelf have not yet been addressed. Furthermore, there is currently no efficient mechanism for monitoring, surveillance and enforcement of management measures.

Lessons from cross-boundary experiences

The Costa Rican Thermal Dome and Portuguese MPA cases underscore the need for the new agreement to enable decision-makers to address the connectivity between biological resources in ABNJ and areas within national jurisdiction. Management systems that embrace an ecosystem approach and ensure consultation and compatibility across boundaries are thus needed to address impacts flowing to and from national waters and the adjacent ABNJ. Mechanisms may also be needed to enhance the participation of coastal States in management of high seas activities that have cross-boundary effects,

to enable monitoring and to incentivize States to fulfill their duties under international and regional agreements.

Lessons from national experiences

In addition to regional efforts in ABNJ, the experience gained in establishing and managing large-scale MPAs within national jurisdictions could also inform a new legally-binding instrument for ABNJ. The Big Ocean network is a global system of large MPAs within national jurisdictions created to support best management practices.²⁵ Like potential MPAs in ABNJ, Big Ocean sites include many areas that are geographically remote, with generally a low level of public awareness about their existence. To increase community engagement, Big Ocean management measures include visitor centres, interactive technology, social media, outreach activities and public talks. Similar measures could help to raise the profile of MPAs in ABNJ.

A number of other lessons can be taken from the experiences of the Big Ocean network. Although technology can reduce cost and increase efficiency in the implementation of management plans, capacity building and enhanced access to relevant technologies are necessary to strengthen management capabilities. Also, innovative partnerships and meaningful engagement with a diverse range of stakeholders can allow MPA management to benefit from additional resources, information and technologies for conservation, monitoring and enforcement in remote ocean areas (Big Ocean, 2013).

KEY ELEMENTS FOR A NEW LEGALLY-BINDING INSTRUMENT FOR ABNJ UNDER UNCLOS

Drawing on these regional, cross-boundary and national experiences, some key elements can be identified for a new legally-binding instrument under UNCLOS to conserve and sustainably manage marine biological diversity in ABNJ.

²⁴The continental shelf is governed under UNCLOS articles 76–85.

²⁵The network comprises 14 sites across seven countries, and collectively covers over 7.5 million km² of marine ecosystems in the Indo-Pacific.

Scientific priorities

One of the most important scientific priorities for ABNJ is to enhance scientific exploration and understanding. As very little is known about the biology and ecology of the high seas and seabed, research in these areas will undoubtedly lead to new discoveries that can help guide management as well as raise awareness and gain the attention essential to prioritize protection (see for example Census, 2010). Cross-boundary connectivity such as widely migratory species linking coastal regions to ABNJ, daily migrations of species from the deep sea to the surface and free-floating larval stages of many marine species are among the phenomena that will benefit from enhanced scientific understanding. Physical, biological and chemical processes that connect land–sea, sea–air and seafloor–water column interactions also need to be studied (Ban *et al.*, 2014). These may all require regionally and vertically integrated management.

A new legally-binding instrument under UNCLOS could provide a mandate to use the best available scientific evidence in biological diversity conservation in ABNJ including for the designation of MPAs. Sound science provides the underpinnings for decisions on vulnerable species, populations, habitats and ecosystems that need to be protected. Scientific data should be standardized, centralized and open-access, and the best available science should be incorporated into the decision-making process, including via online information exchange platforms. A new legally-binding instrument could ensure that provisions on data collection allow for flexibility and appropriate responses to new scientific information as well as to environmental changes.

Management priorities

Various existing criteria and tools for recognizing important marine areas such as the CBD EBSA criteria could be made compatible and incorporated into the decision-making processes.²⁶ Global biogeographic classifications such as the Global Open Ocean and Deep Seabed (GOODS) biogeographic classification (UNESCO, 2009) could

be used to assist in the design of ecologically representative MPA systems. Efforts toward a new legally-binding instrument under UNCLOS could take into account how these and other existing tools might be combined with a management framework to enable comprehensive marine spatial planning in ABNJ (Ardron *et al.*, 2008; Douvère, 2008; Gilman *et al.*, 2011).

Mechanisms for implementation and compliance are critical, including strong predictable systems of surveillance and enforcement (Rayfuse and Warner, 2008). A new legally-binding instrument could institute programmes for capacity building, technology transfer and regular reporting and review to monitor progress toward effective protection and sustainable use. Innovative partnerships with the military and industries that have access to the technologies necessary to study or manage remote ocean areas could provide new resources for conservation and monitoring of ABNJ. The use of remote sensing technologies and analytical tools can be helpful for gathering information on activities in remote and not easily accessible areas (Big Ocean, 2013).

Minimum best practice standards for environmental impact assessments (EIAs) and strategic environmental assessments (SEAs) of activities with a potential to affect MPAs (and marine biological diversity more widely) in ABNJ could be articulated and standardized. As effective management of MPAs in ABNJ will require balancing multiple uses with protection and conservation, environmental regulations need to be clear to all stakeholders.

Training at regional and local levels is needed to enable capacity building and technology transfer to strengthen the capabilities of regional organizations (Rochette *et al.*, 2014a). Technological advances offer tools to reduce cost and increase efficiency in the implementation of management plans, and the development and transfer of appropriate technology is crucial to enable efficient and effective management of MPAs in ABNJ (Gjerde *et al.*, 2013; Rochette *et al.*, 2014b).

Public engagement can enhance awareness of the crucial ecosystem services supplied by marine ecosystems in ABNJ. Processes are needed to provide avenues for input from a range of stakeholders including States, international and regional

²⁶Examples of other criteria include 'vulnerable marine ecosystems' (VMEs) developed by the UN Fish and Agriculture Organization (FAO) and applied by various RFMOs and PSSAs designated by the IMO.

organizations, environmental NGOs and corporations and industry groups, scientific researchers, as well as civil society as a whole. Experiences in the Atlantic suggest that regional management organizations, NGOs and State 'champions' play critical roles in building such partnerships and cultivating broader political will (Druel *et al.*, 2012; O'Leary *et al.*, 2012; Freestone *et al.*, 2014).

One of the most important management priorities is to create opportunities for additional targeted funding and innovative finance mechanisms. Traditional funding sources such as national governments, international institutions like the GEF, and private and institutional donors provide important financial support for marine conservation. To date, however, few of these have focused on biological diversity conservation in ABNJ. Targeted funding and innovative finance mechanisms are needed to help support implementation of MPAs outside national boundaries (Hudson and Glemarec, 2012). Costs could be shared with the beneficiaries of protected areas such as the surrounding fisheries and tourism industries. New approaches may include payment for the ecosystem service benefits of ocean protection, perhaps through mechanisms for taxes, fines and fees from shipping, extractive industries and energy producers (Rogers *et al.*, 2014).

Public-private partnerships to develop ocean infrastructure such as remote sensing platforms that can be used for both industrial and conservation purposes could help bring additional funders and reduce overall funding cost through economies of scale. Establishing a dedicated ocean finance institution to provide loan guarantees and equity and debt instruments as well as to structure transactions and partner new investors might also be required. Where the value of ecosystem services (Costanza *et al.*, 2014) and the availability of specific funding solutions are clearly communicated to key decision-makers, targeted ocean finance could facilitate large-scale MPAs in ABNJ.

Legal priorities

A new legally-binding instrument under UNCLOS would greatly benefit from an effective institutional framework to support conservation in ABNJ. The instrument could create a conference of parties (COP)

and subsidiary bodies such as a scientific and technical advisory committee that could, among other things, review MPA proposals and EIAs, make recommendations and adopt decisions, as well as monitor compliance and assess progress. TA COP could also address concerns arising from the differences in existing governance regimes such as those for the maritime shipping, seabed mining and high seas fishing industries and help tackle the legal issues that concern coastal States including questions on marine and land-based pollution and pelagic migratory species.

The UNCLOS duty to cooperate may need to be clarified and elaborated upon to promote cooperation and reporting among sectoral bodies, conservation organizations and States. This could include: (1) articulating clear requirements for States parties that are members of key sectoral bodies to advance ABNJ protection; (2) ensuring accountability through improved transparency, reporting and inclusive processes; and (3) elaborating upon the duties to notify, consult and participate in EIAs for activities with a potential to affect biological diversity in ABNJ or the waters of adjacent coastal States.

Clear elaboration of shared conservation and governance principles such as precaution and the ecosystem approach could enhance cooperation at all levels. Precaution has been reiterated in several legal agreements including the CBD and the UN 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 (Fish Stocks Agreement, 1995). Under the precautionary principle or approach, the lack of scientific evidence should not defer the adoption of conservation and management measures to prevent environmental degradation (Van Dyke, 2004). Conservation measures could be adopted and applied before activities are authorized in the specific marine area in question as is the case with VMEs. An ecosystem-based management approach is needed to address the full range of impacts of decisions on marine biological diversity in ABNJ. To reflect modern governance principles, decision-making processes should include consultation, public participation, external review and

judicial review (Espoo Convention, 1991; Aarhus Convention, 1998).

There may be a need to encourage and enable existing regional organizations to adopt mandates for conservation in ABNJ as well as to establish new mechanisms for cooperation under a new legally binding instrument where regional bodies are absent or over-stretched. As noted above only a few regional agreements have a legal mandate in ABNJ, leaving most of the areas outside national boundaries without effective institutional coverage.

With respect to the designation and management of MPAs in ABNJ, the COP could be empowered to adopt MPA proposals including conservation objectives, based on the recommendation of a scientific and technical advisory committee. To move beyond the current ad hoc approach to a more systematic framework, recognized scientific experts or bodies could be invited to advise on elements for a representative and well-connected network of MPAs in ABNJ. Upon endorsement of the MPA proposal, some measures could automatically apply, such as special requirements for EIAs. The parties could also opt to adopt conservation measures that would be binding amongst themselves, with a requirement to pursue complementary measures through competent international organizations, where these exist. At the same time, competent international organizations could be invited to adopt management measures to achieve the objectives for which an MPA has been designated, with a time-bound process for review of progress by the COP.

Moving ahead toward a new legally-binding instrument for ABNJ

Discussions on the need for mechanisms to establish and manage MPAs in ABNJ have been continuing for over 40 years (IUCN, 1978; Wild Ocean, 1991;

Earle, pers. comm. 2015).²⁷ As stressors escalate, however, it has become clear to many that the current piecemeal approach is failing and that a comprehensive and effective global governance framework is required. This would provide a regulatory structure along with common goals, principles and standards for biological diversity conservation and sustainable use throughout ABNJ in addition to establishing a framework for comprehensive and systematically designed networks of MPAs (Ban *et al.*, 2013a).

CONCLUSION

A comprehensive, integrated approach to biological diversity conservation and sustainable use in ABNJ is urgently needed to counter the increasing adverse effects from anthropogenic activities in marine areas outside national boundaries. There is currently a palpable lack of regulatory measures to address these impacts.

The UN preparatory process for a new legally-binding instrument under UNCLOS offers a critical and rare opportunity to protect Earth's last conservation frontier. The establishment of a global, coherent, connected and representative system of MPAs is crucial to affording protection to biological diversity in ABNJ. Together with more focused efforts to integrate biological diversity conservation into sectoral management, MPA networks are also vital to achieving the urgent goal articulated in the Promise of Sydney to create a fully sustainable ocean.

As outlined above, some valuable progress has already been made in protecting biological diversity in ABNJ, however, the effort required to date to achieve such progress has been immense (Freestone *et al.*, 2014). This highlights the need to establish formal measures facilitating, at the very least, better inter-organizational cooperation (Ardron *et al.*, 2014). Regional, cross-boundary and national conservation experiences provide lessons that can inform efforts towards achieving better protection of biological diversity in ABNJ. Drawing on these lessons, the authors have identified key scientific, management and legal elements for a new legally-binding instrument under UNCLOS to effectively implement MPAs beyond national boundaries:

²⁷The 14th Session of the General Assembly of the International Union for Conservation of Nature and Natural Resources (now IUCN) urged nations to designate appropriate areas of the deep sea bed as ecological 'baseline reference and resource zones' in which no deepsea mining would be allowed and of a size and shape that will ensure the stability of the zone will be maintained with minimal disruption of the natural state (IUCN, 1978).

Science

- Enhance scientific exploration, research and understanding
- Mandate the use of the best available science

Management

- Integrate existing criteria and tools for recognizing important areas
- Strengthen requirements for monitoring, compliance and enforcement
- Articulate best practice standards for EIAs, SEAs and MSP
- Address technology and capacity needs
- Ensure public engagement
- Create targeted funding and innovative finance mechanisms

Law

- Establish an effective institutional framework
- Enable and expand regional seas organizations
- Clarify and elaborate the UNCLOS duty to cooperate
- Establish clear conservation and governance principles
- Establish a systematic approach to MPA network creation

Urgent action is required to stem the escalating impacts of human activities. Ensuring that these key elements are fostered in a new legally-binding instrument under UNCLOS will help protect Earth's last conservation frontier. This will include a framework for the establishment of networks of MPAs that are underpinned by requirements for effective, science-based management, precaution and an integrated ecosystem approach. There is also a need to fully exercise existing powers and authorities at both global and regional levels to enhance the conservation and sustainable use of marine biological diversity in ABNJ while the international negotiations proceed.

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REFERENCES

- Aarhus Convention. 1998. Convention on Access to Information, Public Participation in Decision-Making and Access to Justice in Environmental Matters, 28 June 1998, 2161 UNTS 447, 38 ILM 517 (1999).
- Abidjan Convention. 1981. Convention for Co-operation in the Protection and Development of the Marine and Coastal Environment of the West and Central Africa Region and Protocol 1981, http://abidjanconvention.org/index.php?option=com_content&view=article&id=104&Itemid=204&lang=en.
- Accord Méditerranée. 1999. Accord Relatif à la Création en Méditerranée d'un Sanctuaire pour les Mammifères Marins, 25 Nov 1999, 2176 UNTS 247.
- Antarctic Treaty. 1959. 1 Dec 1959, 12 UST 794, 402 UNTS 71, 19 ILM 860 (1980).
- Ardron JA, Gjerde K, Pullen S, Tilot V. 2008. Marine spatial planning in the high seas. *Marine Policy* 32: 832–839.
- Ardron JA, Rayfuse R, Gjerde K, Warner R. 2014. The sustainable use and conservation of biological diversity in ABNJ: what can be achieved using existing international agreements? *Marine Policy* 49: 98–108.
- Bailey H, Shillinger G, Palacios D, Bograd S, Spotila J, Paladino F, Block B. 2008. Identifying and comparing phases of movement by leatherback turtles using state-space models. *Journal of Experimental Marine Biology and Ecology* 356: 128–135.
- Ban NC, Bax NJ, Gjerde KM, Devillers R, Dunn DC, Dunstan PK, Hobday AJ, Maxwell SM, Kaplan DM, Pressey RL, et al. 2013a. Systematic conservation planning: a better recipe for managing the high seas for biological diversity conservation and sustainable use. *Conservation Letters* 7: 1–41.
- Ban NC, Mills M, Tam J, Hicks CC, Klain S, Stoeckl N, Bottrill MC, Levine J, Pressey RL, Satterfield T, Chan KMA. 2013b. A social-ecological approach to conservation planning: embedding social consideration. *Frontiers in Ecology and the Environment* 11: 194–202.
- Ban NC, Maxwell SM, Dunn D, Hobday AJ, Bax N, Ardrón J, Gjerde KM, Game ET, Devillers R, Kaplan DM, et al. 2014. Better integration of sectoral planning and management approaches for the interlinked ecology of the open oceans. *Marine Policy* 49: 127–136.
- Barcelona Convention. 1976. *Convention for the Protection of the Mediterranean Sea against Pollution*, 16 Feb 1976, 1102 UNTS 27.
- Big Ocean. 2013. *Big Ocean: a Shared Research Agenda for Large-scale Marine Protected Areas*, Wagner D (ed.). Papahānaumokuākea Marine National Monument and Big Ocean: Honolulu.

- Brooks CM. 2013. Competing values on the Antarctic high seas: CCAMLR and the challenge of marine-protected areas. *The Polar Journal* **3**: 277–300.
- Buck PH (Te Rangi Hiroa). 1938. *Vikings of the Sunrise*. Frederick A Stokes Co: New York.
- Cardinale BJ, Duffy JE, Gonzalez A, Hooper DU, Perrings C, Venail P, Narwani A, Mace GM, Tilman D, Wardle DA, et al. 2012. Biological diversity loss and its impact on humanity. *Nature* **486**: 59–67.
- Census. 2010. *First Census of Marine Life 2010: Highlights of a Decade of Discovery*. In *Census of Marine Life International Secretariat*, JH A, DT C, PE W (eds). Consortium for Ocean Leadership: Washington DC.
- Collective Arrangement. 2014. Collective Arrangement between Competent International Organisations on Cooperation and Coordination regarding Selected Areas in Areas beyond National Jurisdiction in the North-East Atlantic, Sept 2014, http://r.duckduckgo.com/l/?kh=-1&uddg=http%3A%2F%2Fwww.ospar.org%2Fdocuments%2Fdbase%2Fdecrecs%2Fagreements%2F14-09e_collective_arrangement.doc.
- Convention on Biological Diversity [CBD], 29 Dec 1993, 1760 UNTS 79, 31 ILM 818 (1992).
- Convention on the Conservation of Antarctic Marine Living Resources [CCAMLR], 5 May 1980, 33 UST 3476, 1329 UNTS 48, 19 ILM 841 (1980).
- CCAMLR. 2009. Conservation Measure 91-03. Protection of the South Orkney Islands Southern Shelf. CM91-03.
- CCAMLR. 2011a. Report: Workshop on Marine Protected Areas. Brest, France. SC-CAMLR-XXX/06 (29 Aug 2011–2 Sept 2011).
- CCAMLR. 2011b. Conservation Measure 91-04. *CM 91-04*.
- CCAMLR. 2012. Report of the Thirty-First Meeting of the Commission.
- CCAMLR. 2013a. Report of the Second Special Meeting of the Commission.
- CCAMLR. 2013b. Report of the Thirty-Second Meeting of the Commission.
- CCAMLR. 2014. Report of the Thirty-Third Meeting of the Commission.
- CCAMLR. 2015. Report of the Thirty-Fourth Meeting of the Commission.
- Convention for the Protection of the Marine Environment and Coastal Area of the South-East Pacific [Lima Convention], 12 Nov 1981, http://sedac.ciesin.org/entri/texts/marine_environment.coastal.south.east.pacific.1981.html.
- Costanza R, de Groot R, Sutton P, van der Ploeg S, Anderson SJ, Kubiszewski I, Farber S, Turner RK. 2014. Changes in the global value of ecosystem services. *Global Environmental Change* **26**: 152–158.
- Douve F. 2008. The importance of marine spatial planning in advancing ecosystem-based sea use management. *Marine Policy* **32**: 762–771.
- Druel E, Gjerde KM. 2014. Sustaining marine life beyond boundaries: options for an implementing agreement for marine biological diversity beyond national jurisdiction under the United Nations Convention on the Law of the Sea. *Marine Policy* **49**: 90–97.
- Druel E, Ricard P, Rochette J, Martinez C. 2012. Governance of Marine Biological diversity in Areas Beyond National Jurisdiction at the Regional Level: Filling the Gaps and Strengthening the Framework for Action. Case Studies from the North-East Atlantic, Southern Ocean, Western Indian Ocean, South West Pacific and the Sargasso Sea. IDDRI Study No 04/12. IDDRI, Paris.
- Dunn D, Ardron J, Bax N, Bernal P, Cleary J, Cresswell I, Donnelly B, Dunstan P, Gjerde K, Johnson D, et al. 2014. The convention on biological diversity's ecologically or biologically significant areas: origins, development, and current status. *Marine Policy* **49**: 137–145.
- Edgar GJ, Langhammer PF, Allen G, Brooks TM, Brodie J, Crosse W, De Silva N, Fishpool LDC, Foster MN, Knox DH, et al. 2008. Key biodiversity areas as globally significant target sites for the conservation of marine biological diversity. *Aquatic Conservation: Marine and Freshwater Ecosystems* **18**: 969–983.
- Espoo Convention. 1991. Convention on Environmental Impact Assessment in a Transboundary Context, 25 Feb 1991, 1989 UNTS 310.
- Fiedler PC. 2002. The annual cycle and biological effects of the Costa Rica Dome. *Deep-Sea Research I* **49**: 321–38.
- Freestone D, Bulger F. 2016. The Sargasso Sea commission: an innovative approach to the conservation of areas beyond national jurisdiction. 30 *Ocean Yearbook* (forthcoming)
- Freestone D, Morrison KK. 2014. The signing of the Hamilton Declaration on collaboration for the conservation of the Sargasso sea: a new paradigm for high seas conservation? *International Journal of Marine and Coastal Law* **29**: 345–362.
- Freestone D, Johnson D, Ardron JA, Morrison KK, Unger S. 2014. Can existing institutions protect biological diversity in areas beyond national jurisdiction? experiences from two on-going processes. *Marine Policy* **49**: 167–175.
- Gerber LR, Botsford L, Hastings A, Possingham H, Gaines S, Palumbi S, Andelman S. 2003. Population models for reserve design: a retrospective and prospective synthesis. *Ecological Applications* (Special Issue on Marine Reserves) **13**: S47–S64.
- Gilman E, Dunn D, Read A, Hyrenbach K, Warner R. 2011. Designing criteria suites to identify discrete and networked sites of high value across manifestations of biological diversity. *Biological Diversity and Conservation* **20**: 3363–3383.
- Gjerde KM. 2012. Challenges to protecting the marine environment beyond national jurisdiction. Special theme issue for the 30th anniversary of the Law of the Sea Convention. *International Journal of Marine and Coastal Law* **27**: 839–847.
- Gjerde KM, Rulska-Domino A. 2012. Marine protected areas beyond national jurisdiction: some practical perspectives for moving ahead. *International Journal of Marine and Coastal Law* **27**: 351–373.
- Gjerde KM, Dotinga H, Hart S, Molenaar EJ, Rayfuse R, Warner R. 2008a. *Regulatory and governance gaps in the international regime for the conservation and sustainable use of marine biological diversity in areas beyond national jurisdiction*. IUCN, Gland.
- Gjerde KM, Dotinga H, Hart S, Molenaar EJ, Rayfuse R, Warner R. 2008b. *Options for addressing regulatory and governance gaps in the international regime for the conservation and sustainable use of marine biological diversity in areas beyond national jurisdiction*. IUCN, Gland.
- Gjerde KM, Currie D, Wowk K, Sack K. 2013. Ocean in peril: reforming the management of global ocean living resources in

- areas beyond national jurisdiction. *Marine Pollution Bulletin* **74**: 540–551.
- Global Ocean Commission. 2014. *From Decline to Recovery: A Rescue Package for the Global Ocean*. Global Ocean Commission: Oxford.
- Hamilton Declaration on Collaboration for the Conservation of the Sargasso Sea, February 2014, http://r.duckduckgo.com/1/?kh=-1&uddg=http%3A%2F%2Fwww.sargassoalliance.org%2Fstorage%2Fdocuments%2FHamilton_Declaration_on_the_Conservation_of_the_Sargasso_Sea_11_March_2014.pdf.
- Hart S. 2008. Elements of a Possible Implementation Agreement to UNCLOS for the Conservation and Sustainable Use of Marine Biological diversity in Areas beyond National Jurisdiction. IUCN, Gland, Switzerland.
- Howell KL, Davies JS, Narayanaswamy BE. 2010. Identifying deep-sea megafaunal epibenthic assemblages for use in habitat mapping and marine protected area network design. *Journal of the Marine Biological Association the United Kingdom* **90**: 33–68.
- Hudson A, Glemarec Y. 2012. *Catalysing Ocean Finance Volume I Transforming Markets to Restore and Protect the Global Ocean*. United Nations Development Programme and Global Environmental Facility: New York.
- IUCN. 1978. Resolution 6, Deep Sea Mining. In *Proceedings of the 14th General Assembly of IUCN and 14th IUCN Technical Meeting*, Ashkhabad, 26th September–5th October 1978. International Union for the Conservation of Nature and Natural Resources, Morges.
- IUCN. 2014. A strategy of innovative approaches and recommendations to enhance implementation of marine conservation in the next decade. *The Promise of Sydney: innovative approaches for change*. IUCN World Parks Congress, Sydney 2014, <http://worldparkscongress.org/downloads/approaches/ThemeM.pdf>.
- International Maritime Organization [IMO]. 2006. Revised Guidelines for the Identification and Designation of Particularly Sensitive Sea Areas, Res A.982(24), A/24/Res.982 (6 February 2006).
- Jacquet J, Brooks C. 2015. Conservation: is it rational to protect Antarctica. *Nature* **528**: 39.
- Johannesburg Plan of Implementation (UN Doc. A/CONF.199/20 (4 September 2002) Resolution II, Annex, Point 32(c)).
- Johnson D 2013. Can competent authorities cooperate for the common good: towards a collective arrangement in the North-East Atlantic. In *Environmental Security in the Arctic Ocean, NATO Science for Peace and Security Series C: Environmental Security*, Berkman PA, Vylegzhanin AN (eds). Springer: Dordrecht, Netherlands.
- Johnson D, Ardron J, Billett D, Hooper T, Mullier T, Chaniotis P, Ponge B, Corcoran E. 2014. When is a marine protected area network ecologically coherent? A case study from the North-east Atlantic. *Aquatic Conservation: Marine and Freshwater Ecosystems* **24** (Supplement 2): 44–58.
- Juffe-Bignoli D, Burgess ND, Bingham H, Belle EMS, de Lima MG, Deguignet M, Bertzky B, Milam AN, Martinez-Lopez J, Lewis E, et al. 2014. *Protected Planet Report 2014*. UNEP-WCMC, Cambridge.
- Kessler WS. 2006. The circulation of the eastern tropical Pacific. *Progress in Oceanography* **69**: 181–217.
- Koh TTB. 1982. A Constitution for the Oceans. United Nations Conference on the Law of the Sea, 6 and 11 December 1982, Montego Bay, Jamaica.
- Kohona PTB, Lijnzaad L. 2015. Letter dated 13 February 2015 from the co-chairs of the ad hoc open-ended informal working group to the President of the General Assembly, A/69/780, United Nations General Assembly, 69th ses, Item 74(a) (13 February 2015).
- Laffoley D, Baxter JM, Thevenon F, Oliver J. 2014. *The Significance and Management of Natural Carbon Stores in the Open Ocean*. IUCN: Gland.
- Lodge M, Johnson D, Le Gurun G, Wengler M, Weaver P, Gunn V. 2014. Seabed mining: International Seabed Authority environmental management plan for the Clarion–Clipperton zone: a partnership approach. *Marine Policy* **49**: 66–72.
- Malo D. 1951. *Hawaiian Antiquities (Moolelo Hawaii)*. Translated by Emerson NB. Bishop Museum Special Publication 2, Bishop Museum Press: Honolulu.
- Mangos A, André S. 2008. Analysis of Mediterranean marine environment protection: the case of the Pelagos Sanctuary. *Plan Bleu*, <http://planbleu.org/en/print/publications/analyse-de-la-protection-du-milieu-marin-mediterraneen-cas-du-sanctuaire-pelagos>.
- Margules CR, Pressey RL. 2000. Systematic conservation planning. *Nature* **405**: 243–253.
- Mate B, Lagerquist BA. 1999. Movements of north pacific whales during the feeding season off southern California and their southern fall migration. *Marine Mammal Science* **15**: 1246–1257.
- Mayol P, Labach H, Couvat J, Ody D, Robert P. 2013. Particularly Sensitive Sea Area (PSSA): an IMO status as an efficient management tool of Pelagos. In *IMPAC 3*. Marseille. http://www.souffleursdecume.com/docs/SE_2013-abstract-zmpv-impac3.pdf
- Millennium Ecosystem Assessment. 2005. *Ecosystems and Human Well-being: Biological diversity Synthesis*. World Resources Institute, Washington, DC.
- Molenaar E, Elferink AGO. 2009. Marine Protected Areas in areas beyond national jurisdiction: the pioneering efforts under the OSPAR Convention. *Utrecht Law Review* **5**: 5–20.
- Morrison KK, Freestone D. 2014. The Sargasso Sea. *International Journal of Marine and Coastal Law* **29**: 345–62.
- Nairobi Convention. 1985. *Convention for the Protection, Management and Development of the Marine and Coastal Environment of the Eastern African Region and related protocols, 21 June 1985*. UNEP, http://www.unep.org/NairobiConvention/docs/English_Nairobi_Convention_Text.pdf.
- Notarbartolo di Sciara G. 2009. The Pelagos Sanctuary for the conservation of Mediterranean marine mammals: an iconic high seas MPA in dire straits. In *2nd International Conference on Progress in Marine Conservation in Europe*. Stralsund, Germany (2–6 November 2009).
- Notarbartolo di Sciara G, Agardy T, Hyrenbach D, Scovazzi T, Van Klaveren P. 2008. The Pelagos Sanctuary for Mediterranean Marine Mammals. *Aquatic Conservation: Marine and Freshwater Ecosystems* **18**: 367–391.
- Noumea Convention. 1986. *Convention for the Protection of the Natural Resources and Environment of the South Pacific Region*, 24 Nov 1986, <http://www.sprep.org/legal/the-convention#text>.

- O'Leary BC, Brown RL, Johnson DE, von Nordheim H, Ardron J, Packeiser T, Roberts CM. 2012. The first network of marine protected areas (MPAs) in the high seas: the process, the challenges and where next. *Marine Policy* **36**: 598–605.
- OSPAR Commission. 2011. *2010 Status Report on the OSPAR Network of Marine Protected Areas*, <http://qsr2010.ospar.org/en/index.html>.
- OSPAR Commission. 2012. Guidelines for the Management of Marine Protected Areas in the OSPAR Maritime Area (Ref: 2003-18) as amended in 2006 by the OSPAR Biological Diversity Committee (BDC) (BDC Summary Record 2006 (0610/1) § 3.46).
- OSPAR Commission. 2013. *2012 Status Report on the OSPAR Network of Marine Protected Areas*, http://www.ospar.org/documents/dbase/publications/p00618/p00618_2012_mpa_status%20report.pdf
- OSPAR Convention. 1992. *Convention for the Protection of the Marine Environment of the North-East Atlantic, 22 Sept 1992, 2354 UNTS 67, 32 ILM 1069 (1993)*.
- Pressey RL. 2007. Conservation planning for a changing climate. In *Proceedings of a WWF and IUCN Commission on Protected Areas symposium*, Taylor M, Figgis P (eds). WWF-Australia: Canberra, Australia.
- Pressey RL, Bottrill MC. 2009. Approaches to landscape and seascape-scale conservation planning: convergence, contrasts and challenges. *Oryx* **43**: 464–475.
- Rayfuse R, Warner RM. 2008. Securing a sustainable future for the oceans beyond national jurisdiction: the legal basis for an integrated, cross-sectoral regime for high seas governance for the 21st century. *International Journal of Marine and Coastal Law* **23**: 399–421.
- Reeve LLN, Rulska-Domino A, Gjerde KM. 2012. The future of high seas marine protected areas. In *Ocean Yearbook*, Chircop A, et al. (eds). **26**: 265–284.
- Ribeiro MC. 2014. Marine protected areas: the case of the extended continental shelf. In *30 years after the Signature of the United Nations Convention on the Law of the Sea: the Protection of the Environment and the Future of the Law of the Sea*, Coimbra Editora, SA: Coimbra; 179–207.
- Rochette J, Wright G. 2015. *Developing area-based management tools in areas beyond national jurisdiction: possible scenarios for the Western Indian Ocean*. IDDRI, Paris.
- Rochette J, Unger S, Herr D, Johnson D, Nakamura T, Packeiser T, Proelss A, Visbeck M, Wright A, Cebrian D. 2014a. The regional approach to the conservation and sustainable use of marine biological diversity in areas beyond national jurisdiction. *Marine Policy* **49**: 109–117.
- Rochette J, Gjerde KM, Druel E, Ardron JA, Craw A, Halpin P, Pendleton L, Teleki K, Cleary J. 2014b. Delivering the Aichi target 11: challenges and opportunities for marine areas beyond national jurisdiction. *Aquatic Conservation: Marine and Freshwater Ecosystems* **24**(suppl.2): 31–43.
- Rochette J, Wright G, Gjerde KM, Griebler T, Unger S, Spadone A. 2015b. *A New Chapter for the High Seas?* IDDRI: Paris.
- Rochette J, Billé R, Molenaar EJ, Drankier P, Chabason L. 2015a. Regional oceans governance mechanisms: a review. *Marine Policy* **60**: 9–19.
- Rogers AD, Laffoley Dd'A. 2011. *International Earth System Expert Workshop on Ocean Stresses and Impacts: Summary Report*. International Programme to Study the Ocean: Oxford.
- Rogers AD, Sumaila UR, Hussain SS, Baulcomb C. 2014. *The high seas and us: understanding the value of high-seas ecosystems*. Global Ocean Commission, Oxford.
- Thomas HL, MacSharry B, Morgan L, Kingston N, Moffitt R, Stanwell-Smith D, Wood L. 2014. Evaluating official marine protected area coverage for Aichi Target 11: appraising the data and methods that define our progress. *Aquatic Conservation: Marine and Freshwater Ecosystems* **24**(Suppl. 2): 8–23.
- United Nations 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, 4 Aug. 1995, 2167 UNTS 88, 34 ILM 1542 (1995).
- United Nations Convention on the Law of the Sea [UNCLOS], preamble, 10 December 1982, 1833 UNTS 397, 21 ILM 126 (1982).
- United Nations Educational, Scientific and Cultural Organization [UNESCO]. 2009. *Global Open Oceans and Deep Seabed (GOODS) – Biogeographic Classification*. Paris, UNESCO-IOC. (IOC Technical Series 84).
- UNEP. 2007. *Deep Sea Biological Diversity and Ecosystems: A Scoping Report on their Socio-Economy, Management and Governance*. UNEP-WCMC Biological Diversity Series no. **28**.
- UNEP. 2008. *Decision Adopted by the Conference of the Parties to the CBD at Its 9th Meeting*, UNEP/CBD/COP/DEC/IX/20.
- UNEP. 2010. *Decision Adopted by the Conference of Parties to the CBD at Its 10th Meeting*, UNEP/CBD/COP/DEC/X/29.
- UNEP. 2012. *Decision Adopted by the Conference of the Parties to the Convention on Biological Diversity at its 11th Meeting*, UNEP/CBD/COP/DEC/XI/17.
- United Nations General Assembly [UNGA]. 2012. *The Future We Want*. GA Res 66/288, 66th session, A/RES/66/288 (11 September 2012).
- UNGA. 2012. *Implementation of Agenda 21, the Programme for the Further Implementation of Agenda 21 and the outcomes of the World Summit on Sustainable Development and of the United Nations Conference on Sustainable Development*. GA Res 67/203, 67th session, A/RES/67/203 (27 February 2013).
- UNGA. 2015. *Development of an international legally-binding instrument under the United Nations Convention on the Law of the Sea on the conservation and sustainable use of marine biological diversity of areas beyond national jurisdiction*. GA Res 69/922, 69th session, A/RES/69/922 (19 June 2015).
- Van Dover CL. 2014. Impacts of anthropogenic disturbances at deep-sea hydrothermal vent ecosystems: a review. *Marine Environmental Research* **102**: 59–72.
- Van Dyke JM. 2004. The evolution and international acceptance of the precautionary principle. In *Bringing New Law to Ocean Waters*, Caron DD, Scheiber HN (eds). Martinus Nijhoff: Netherlands.
- Warner R, Gjerde K, Freestone D. 2013. Regional governance for fisheries and biological diversity. In *Governance for Fisheries and Marine Conservation: Interactions and Co-evolution*, Garcia S, Charles T, Rice J (eds). Wiley Blackwell: Chichester; 211–224.
- Wild Ocean. 1991. *Resolution of the Wild Ocean Reserves International Workshop*. Honolulu, Hawaii, October 2: 1991 (on file with lead author).