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Area expansion versus effective and equitable management in international marine protected areas goals and targets

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ABSTRACT

This paper draws on the published literature on marine protected areas (MPAs) and marine protected areas targets to argue that the MPA target (14.5) will dominate in the pursuit, measurement, and evaluation of the much broader 'oceans' Sustainable Development Goal (SDG14) adopted by the United Nations General Assembly (UNGA) in 2015. MPAs are a 'privileged solution' in marine conservation, in part because their expansion is relatively easy to measure and there is opportunity for further expansion in the mostly unprotected global ocean. However, the evolution of MPA targets over time in organizations like the Convention on Biological Diversity (CBD) and the International Union for the Conservation of Nature (IUCN) illustrates the importance of other means for achieving conservation and of elements other than area coverage, including the need to ensure MPAs are effectively and equitably managed. By excluding these important, but contested, complex, and difficult to measure components, Target 14.5 is likely to be met. However, the meaning of this success will be limited without concerted efforts get beyond area coverage.

1. Introduction

Oceans advocates pushed for and celebrated the inclusion of an ocean specific Sustainable Development Goal (SDG), number 14 among the 17 adopted by the United Nations General Assembly (UNGA) in September 2015 [1–3]. The goal is to "conserve and sustainably use the oceans, seas and marine resources for sustainable development" by 2030 [4]. With ten specific targets covering a range of topics –pollution, fisheries, resilient coastal ecosystems, and more – SDG 14 reflects increased attention to ocean issues in international forums over the past decade and the emergence of a global oceans conservation agenda [5–7]. A central feature of that agenda and a component of the oceans SDG is the establishment of conservation areas in "at least 10% of coastal and marine areas" (Target 14.5), indicated by "coverage of protected areas in relation to marine areas" (indicator 14.5.1) [4].

The articulation of this MPA target within SDG 14 is one of many adopted in international forums since 2002. Among these, SDG Target 14.5 is relatively simple (Section 2). The paper argues that, in part because of this simplicity, the MPA target will dominate in the pursuit, measurement, and evaluation of the much broader oceans SDG and Target 14.5 is likely to be met. However, the exclusion of broader concerns about MPAs in the language of Target 14.5—concerns incorporated into MPA targets in the Convention on Biological Diversity (CBD) and the International Union for Conservation of Nature (IUCN)—means this success will be limited.

In support of this argument, the paper is structured as follows. Section 2 reviews the evolution of MPA targets in the UNGA, IUCN, and CBD, highlighting differences and similarities among iterations of MPA targets over time. Changes to targets over time support the argument that SDG Target 14.5 is relatively simple and hint at the challenges of implementing MPAs targets (discussed further in Section 4). Section 3 draws on a wide range of scholarship on protected areas to identify three reasons the MPA Target will dominate the oceans SDG: i) protected areas are a 'privileged' solution in conservation, and in marine conservation specifically; ii) MPA area coverage targets are (relatively) SMART (Specific, Measurable, Achievable, Realistic, and Time-bound); and iii) opportunity for MPA expansion is vast. Combined with the target's relative simplicity, Section 3 supports the claim that SDG Target 14.5 is likely to be met. Section 4 returns to the evolution of targets, by reviewing some of the tensions around MPAs and MPA targets in the CBD and IUCN, tensions reflected in the evolution in target wording over time. In describing tensions and responses to them, Section 4 contextualizes the relative simplicity of SDG Target 14.5 in broader debates about MPAs and their role in global biodiversity conservation. Whether intentional or not, by adopting a simple version of the MPA target, the UN may have ensured SDG Target 14.5's success. However,

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the tensions that have led to the increasing complexity in the IUCN and CBD MPA targets are likely to overflow to their pursuit via the SDGs, and Section 5 considers the implications of both success and overflow, by reflecting on what they imply for oceans conservation generally, and for marine protected areas specifically.

The paper draws on several existing reviews of MPAs and/or progress towards MPA targets, many of which raise some of the same concerns addressed in this paper. The paper is distinct, however, in that it combines the insights from these reviews with the authors' own research on the evolution of MPA targets to consider *why* MPAs will continue to dominate marine conservation generally, and why areal coverage will continue to dominate measures of success specifically, in spite of the cited studies showing the limits to and challenges with MPA expansion for achieving conservation. For the past decade, the authors have studied the production of MPA targets in two conservation organizations—the CBD and the IUCN—and in the UNGA. The research has involved tracking debates about targets as reflected in documents (position papers, scientific and technical rationales, peer reviewed academic papers, etc.), as witnessed during meetings where targets have been negotiated or discussed (2008 IUCN World Conservation Congress; 2010 Conference of the Parties to the CBD; 2012 UN Conference on Sustainable Development; 2014 IUCN World Parks Congress; 2016 IUCN World Conservation Congress; 2018 22nd Meeting of the Subsidiary Body on Scientific, Technical and Technological Advice to the CBD), and as articulated by interviewees involved in or seeking to influence such negotiations. This paper references published results of this work (rather than new data), where further details of the methods and analysis can be found.

2. The evolution of MPA targets

Table 1 shows the evolution of MPA targets over time, as articulated by the UNGA, the IUCN, and the CBD. Specific features of this evolution are integrated into subsequent sections, but general trends of note are

Table 1
MPA targets over time in the UNGA, IUCN, and CBD.

	Year/Event (Source)	Target	Points of interest
UNGA	2002. United Nations World Summit on Sustainable Development [8]	"Develop and facilitate the use of diverse approaches and tools, including… marine protected areas consistent with international law and based on scientific information, including representative networks by 2012" (Section IV, paragraph 32 (c))	– Identified MPAs – No quantification of area-based coverage target
IUCN	2003. IUCN World Parks Congress [9]	"Greatly increases the marine and coastal area managed in MPAs by 2012; these networks should be extensive and include strictly protected areas that amount to at least 20–30% of each habitat, and contribute to a global target for healthy and productive oceans." (Recommendation V.22, paragraph 1 (a))	– Quantified MPA area-based coverage target of 20–30% 'strictly protected' – Specified coverage across diverse habitats
CBD	2006. 8th Conference of the Parties to the Convention on Biological Diversity [10]	"At least 10% of each of the world's marine and coastal ecological regions effectively conserved [by 2012]" (Decision VII/15, Annex IV)	– Quantified conservation target of 10% – No specification of area-based coverage, or MPAs – Specified coverage across diverse ecological regions – Maintained deadline of 2012, in contrast to other CBD targets with 2010 deadline
CBD	2010. 10th Conference of the Parties to the Convention on Biological Diversity [11]	"By 2020, at least … 10 per cent of coastal and marine areas, especially areas of particular importance for biodiversity and ecosystem services, are conserved through effectively and equitably managed, ecologically representative and well connected systems of protected areas and other effective area-based conservation measures, and integrated into the wider landscapes and seascapes" (Decision X/2, Annex IV, "Aichi Target 11").	– Retained 10% target, but specified area-based coverage and MPAs – Introduced elements of effective/equitable management, ecosystem services, and other effective area-based conservation measures (OECMs)
UNGA	2012. United Nations Conference on Sustainable Development ("Rio +20) [12]	"We reaffirm the importance of area-based conservation measures, including marine protected areas, consistent with international law and based on best available scientific information, as a tool for conservation of biological diversity and sustainable use of its components. We note decision X/2 of the tenth meeting of the Conference of the Parties to the Convention on Biological Diversity…[see CBD text above]" (UN A/RES/66/288, paragraph 177)	– Following preamble, retained CBD target text in its entirety
IUCN	2014. IUCN World Parks Congress [13]	"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 biodiversity 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."	– Reasserted 30% area-based MPA target, with additional emphasis on 30% with 'no extractive activities' – Added effective/equitable management, ecosystem services, OECMs
UNGA	2015. The Sustainable Development Goals / Transforming Our World: the 2030 Agenda for Sustainable Development [4]	"By 2020, conserve at least 10 per cent of coastal and marine areas, consistent with national and international law and based on the best available scientific information" (paragraph 14.5)	– Reaffirmed CBD area-based target of 10% – Specific reference to MPAs in indicator 14.5.1, rather than target – No reference to effective/equitable management, ecological connectivity or representativeness, ecosystem services
IUCN	2016. IUCN World Conservation Congress [14]	"ENCOURAGES IUCN State and Government Agency Members to designate and implement at least 30% of each marine habitat in a network of highly protected MPAs and other effective area-based conservation measures, with the ultimate aim of creating a fully sustainable ocean, at least 30% of which has no extractive activities, subject to the rights of indigenous peoples and local communities" (Resolution 53, paragraph 2)	– Built on language from 2014 WPC, by specifying OECMs and by recognizing indigenous and local rights

described here. Two of the most notable differences among targets is the level of ambition regarding area coverage and the specification of additional criteria; the IUCN has consistently identified a much higher percentage for MPA area coverage, specified the need for no-take MPAs, and emphasized ecological elements. The UNGA and CBD have stipulated lower levels of coverage, and reflect a more broadly construed understanding of conservation, sometimes omitting specific reference to protected areas. Table 1 also reveals the interactive and at times synergistic nature of targets. Examples include: i) the IUCN's interest in conservation across regions, stipulated in its first target, is retained in later iterations of targets in all institutions; ii) the Rio + 20 outcome document reproduced the CBD target in its entirety in defining its goals for MPAs; iii) the IUCN's 2016 target adopts much of the language of CBD Aichi Target 11. Of particular interest in this paper is the inclusion of other effective area-based conservation measures (OECMs) and effective and equitable management of MPAs. For each institution, subsequent iterations of targets are increasingly complex: until SDG Target 14.5. Sections 3 and 4 combine to contextualize this evolution and its implications are discussed in Section 5.

3. MPAs in marine conservation

3.1. Protected areas as privileged solution

Protected areas (PAs) have long been a central focus of conservation organizations, a 'privileged' (i.e. preferred or taken for granted) solution premised on the perceived need to separate nature from humans in order to conserve it [15,16]. The World Commission on Protected Areas (WCPA) is one of the oldest and largest within the IUCN and the CBD identifies PAs as "cornerstones for biodiversity conservation" (http://www.cbd.int/protected/overview, accessed January 2018). The privileged status of PAs continues in spite of a variety of critiques, beginning in the 1980s, related to their impacts on human communities [17–19], and resiliency of the PA concept is in part due to its malleability; in contrast to the original vision of setting aside and preserving nature in a 'pristine' state untouched by humans (or particular kinds of humans and activities), protected areas are increasingly "put to work [for people] to sequester carbon, to protect ecosystem services, and in some cases, to protect and even promote human rights" [20] (p.191). The IUCN's current definition of a PA is a "clearly defined geographical space, recognised, dedicated and managed, through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values" and the IUCN recognizes six categories of protected areas with different levels of human interaction and use [21]. Malleability has allowed the PA concept to persist in spite of proponents sometimes holding contradictory objectives; struggles over the meaning of PAs in institutions like the CBD, rather than undermining the protected areas ideal, contribute to its hegemony [20]. As opponents of strict protection push for their interests to be accommodated in different kinds of PAs, the PA model is reinforced [20].

Although terrestrial PAs have existed since the late 1800s, MPAs have a more recent history, with fewer than 500 established prior to 1985 [22]; since then, MPAs have expanded rapidly in both number of sites and the total area protected. The initial period of expansion coincided with reflection on the concept of protected areas generally, and thus the "vague, and open-ended" [23] (p.12) term MPA "refers to a variety of spatial approaches to marine conservation" [24] (p.64). This variety, in turn, impacts on the ability to precisely measure MPA expansion; figures vary depending on what is counted (e.g. implemented versus declared MPAs; MPAs with various levels of resource use versus strictly protected MPAs; fisheries management areas or shark sanctuaries, etc.) and by whom. According to preparatory documents circulated in May 2017 for the July 2017 High Level Political Forum on Sustainable Development, where SDG 14 progress was reviewed, 5.3% of the global ocean is within MPAs (13.2% of areas within exclusive economic zones (EEZs) and 0.25% of areas beyond national jurisdiction) [25]. In June 2017, a CBD press release at the UN Ocean Conference put these numbers at 5.7% of global oceans and 14.4% of EEZs (https://www.cbd.int/doc/press/2017/pr-2017-06-05-mpa-pub-en.pdf, accessed January 2018). At the time of writing, the marine page of the IUCN's protected planet website lists global oceans coverage at 7.44% (www.protectedplanet.net/marine, accessed August 2018). These are some of the higher figures; the MPA Atlas excludes some categories of MPA that the IUCN counts, includes others that it does not, and counts only implemented MPAs. They report that 3.7% of global oceans are protected (http://www.mpatlas.org, accessed August 2018). There are debates over "what *is being* counted vs. what *should be* counted" [26] (p.11).

As different calculations of coverage according to different assessments of what 'counts' as an MPA reveal, the MPA concept has been contested [26,27]. Some of the debate is reflected in the differences in the CBD/UNGA versus the IUCN targets; the IUCN's target is both higher (30% coverage of each ecoregion) and more restrictive (30% of MPAs should be 'no-take') (Table 1). Other points of contest include different commitments to local versus expert knowledge or ideas about the appropriate scale for governance, and result in dramatically different MPAs in form and function [6,28]. Gray et al. [24] argue that such differences do not detract from the power of MPAs as an idea. Drawing on negotiations around the CBD's Aichi Target 11 during the 10th Conference of the Parties (CBD COP10), Gray et al. [24] (p.65–66) characterize MPAs as 'boundary objects', "flexible enough to enable diverse groups with divergent agendas to align at the CBD around the goal of increasing MPA coverage." The flexibility of the MPA concept allows for MPA expansion and for consensus within institutions like the CBD that MPA expansion is the appropriate goal. Although some marine conservationists have expressed concerns about rapid MPA expansion [6], the MPA imperative remains mostly unchecked. This is at least in part because they are good, or rather SMART, targets.

3.2. Protected areas as SMART targets

As conservation and development goals and targets have become more numerous, so have critiques of their strengths and weaknesses as governance tools (e.g.) [29,30]. Here, the focus is on one component of the targets debate: how to make them Specific, Measurable, Achievable, Realistic, and Time-bound, or SMART [31,32]. When it became clear that the CBD would miss almost all of its 2010 targets, much of the blame was laid on the articulation of targets that were *not* SMART, and how to make targets SMART dominated of the renegotiation of the CBD Aichi Targets for 2020 [33]. Summarizing the implications of SMART targets, Campbell et al. [33] (p.43) point out that they require "more, higher quality, geographically distributed data; clearly defined indicators to measure progress; and institutional mechanisms to link monitoring and decision-making."

Within the suite of Aichi Targets, the protected areas Target 11 is relatively smart (or at least the MPA component is getting smarter [34]) and some elements are smarter than others. "While information may be imperfect, the number, size, and location of most of the world's PAs are documented in the World Database on Protected Areas" [33] (p.53); it can be used to assess progress towards total area coverage and area coverage per ecoregion. Thus, area coverage is measurable (albeit contested, see Section 3.1) and measurement reveals "one of the greatest successes the conservation movement has had over the last decade" [35] (p.5). In the CBD's first set of biodiversity targets for 2010, PA coverage was one of the very few for which positive progress was reported [36]. Amidst the general gloom about the failure to meet the 2010 targets, as reported in Global Biodiversity Outlook 3 [36], PA expansion provided a bright spot in the discussions at CBD COP10 [33].

This is particularly true for MPAs. By any measure of coverage, MPA expansion has been rapid. The CBD calculates that since it entered into force in 1993, MPA coverage has expanded 20-fold (https://www.cbd.int/doc/press/2017/pr-2017-06-05-mpa-pub-en.pdf, accessed January

2018). In spite of this growth, marine spaces still remain relatively unprotected when compared to terrestrial ones. Global ocean MPA coverage (combined coverage within EEZs and in areas beyond national jurisdiction (ABNJ)) falls short of any percentage named in the successive MPA targets, particularly coverage in no-take marine reserves that the IUCN advocates (Table 1). Thus, ocean spaces offer unparalleled opportunity for further expansion of protected areas.

3.3. Conservation opportunity in oceans

Opportunity for MPA expansion arises for a number of reasons. First, opportunity lies in the vast area of oceans—covering 70% of the planet—and the vast area unprotected; even the high-end estimates put global ocean MPA coverage at around 7%. Second, although there remains some debate over the effectiveness of MPAs in achieving both ecological and social objectives, there is broad scientific support for MPAs as essential tools for marine biodiversity conservation [37]. More specifically, evidence suggests that larger, well-enforced, no-take marine reserves can have positive ecological effects [38,39]. Third, unlike in the terrestrial realm, the politics and practice of removing people from their homes in order to establish MPAs is bypassed (although there can be similar negative impacts associated with restricting or reallocating access to resources through MPAs, e.g. [40,41]). Fourth, and particularly in western countries, ocean spaces and resources are often considered public trust resources, rather than private. Even in countries where percent MPA coverage is similar to terrestrial PA coverage, these features of oceans can make MPA expansion appear more feasible and/or politically expedient.

One place where opportunity has been seized (and demonstrated) is within the EEZs of many small island states, where the extent of territory on land is dwarfed by territory at sea [42]. Although the first large MPA (LMPA) was established in Australia when the Great Barrier Reef was protected in 1975, the LMPA phenomenon began in 2006, when Papahānaumokuākea was declared a United States Marine National Monument and Kiribati announced its intention to create a large marine reserve in 10% of its EEZ, the 12th largest EEZ in the world. Since that time, it has become difficult to keep pace with the establishment of these sites, more than ½ of them larger than 250,000 km^2 and at least four larger than 1,000,000 km^2 (http://www.mpatlas.org/protection-dashboard/very-large-mpas, Accessed January 25, 2018; see also [43]). LMPAs account for much of the dramatic increase in global MPA coverage; Toonen et al. [44] report that the first seven LMPAs accounted for 80% of global MPA coverage at that time. There are now 33 LMPAs, and the trend is towards ever larger ones (http://www.mpatlas.org/protection-dashboard/very-large-mpas/, accessed Jan. 25, 2018).

The opportunity to expand MPA coverage has been realized primarily within EEZs. However, 64% of ocean surface is in ABNJ where MPAs are few. Without MPAs in ABNJ, EEZ coverage would have to increase to ~ 25% to meet a 10% global target [27]. Although the CBD now predicts this will be achieved by 2020 (https://www.cbd.int/pa/UN-Ocean-Conference/flyer-en.pdf, accessed January 2018), the opportunity for MPA expansion in ABNJ is immense. Ocean conservation advocates have been working within the UN system to address what has been labeled a 'governance gap' for biodiversity conservation and identify the high seas as earth's 'last conservation frontier' [45]. In December 2017, the UN General Assembly resolved to begin formal negotiations on an international legally binding instrument under UNCLOS that would enable the establishment of high seas MPAs, among other things [46]. Until such an agreement is reached, MPA expansion in ABNJ will be restricted to places where regional agreements support their designation. For example, in December 2017, the Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR) established a 1.55 million km^2 MPA in the Ross Sea [47] (p.234).

To be realized, the conservation opportunity in the oceans must be supported both institutionally and financially, and funding for ocean conservation generally, and for MPAs specifically, has increased. A 2014 report on progress to the Aichi Targets identified increased funding for MPAs as a success [48]. Philanthropic investment in oceans increased from US$252 to US$399 Million over the period 2010–2015; within this portfolio MPAs are one of the most funded investments, second only to fisheries [49]. Philanthropic interest in oceans generally and MPAs specifically, combined with the role MPAs may play in multiple visions of the 'blue economy' [50], suggest ongoing support for MPA expansion is likely, though not guaranteed.

4. Beyond MPA area expansion

The expansion of MPAs seems to present an unparalleled conservation success and further opportunity. However, the evolution of MPA targets is indicative of challenges to the MPA solution. Points of evolution include: percent area coverage, other effective conservation measures, representative features, network characteristics, effective management, equitable management, and the rights of Indigenous peoples and local communities. Here the focus is on two inter-related points that have been particularly challenging: 1) the debate around 'counting' other effective conservation measures; 2) the prospects for delivering and measuring effective and equitable MPA management.

4.1. What counts as protection?

Although what counts as an MPA is debated (Section 3.1), the IUCN World Database on Protected Areas is accepted as the official measure of MPA coverage. In 2010, the Parties to the CBD launched new debates over what counts with the introduction of the phrase 'other effective area-based conservation measures' (OECMs) to Aichi Target 11. However, a lack of guidance regarding the definition has led to uncertainty regarding what can be counted and reported as an OECM [51–53]. To address this, in 2015 the IUCN established a Task Force on Other Effective Area-based Conservation Measures, in coordination with the CBD.

The IUCN has included the phrase 'legal or other effective means' in multiple iterations of their PA definition in order to account for the role of non-state actors in PA governance [20]. Despite the long history of Indigenous and Community Conserved Areas (ICCAs) in many parts of the world, and the significant contribution of these to the conservation and sustainable use of biodiversity, they have only recently been formally recognised as potentially contributing to state-led protected area systems [20,21,51]. However, not all ICCAs fall within PA systems, either because they do not meet PA definitions or because Indigenous owners do not want them classified as PAs [51]; this motivated some ICCA advocates to push for their recognition as OECMs (although this strategy is debated among Indigenous groups and advocates [20]). In the marine realm, many actors have argued for recognition of the contribution of locally-managed marine areas (LMMAs), common in many Pacific island communities, to marine conservation targets. However, LMMA supporters have been critical of the IUCN guidelines for protected areas, which demand a primary objective of nature conservation, in contrast with LMMAs, which focus on culturally-embedded sustainable resource use [54].

This represents one of the key debates in determining what counts as an OECM: whether nature conservation must be the primary *objective* or simply an *outcome*. For some, OECMs must have nature conservation as the primary objective [53]. For others, regardless of their primary objectives (e.g. sustainable use, cultural heritage preservation), OECMs can have conservation outcomes, either intended (as a secondary objective) or unintended (as an ancillary benefit) [52]. In the IUCN Draft Guidelines for Recognizing and Reporting Other Effective Area-based Conservation Measures [55] (p.14), an OECM is defined as: "A geographically defined space, not recognised as a protected area, which is governed and managed over the long-term in ways that deliver the effective in-situ conservation of biodiversity, with associated ecosystem services and cultural and spiritual values." With this definition, the

IUCN aligns with the view that conservation can be an outcome of OECMs, regardless of whether or not it is an objective. The CBD's Subsidiary Body on Scientific, Technical, and Technological Advice (SBSTTA) has similarly reinforced this view, recommending that the CBD Conference of the Parties adopt a definition of OECMs that requires them to achieve positive, long-term outcomes for biodiversity conservation [56].

Many observers have expressed concern that a lack of guidance or a vague or general definition of OECM will lead jurisdictions to 're-brand' areas as conservation initiatives rather than increase conservation actions [23,52,53,57]. During negotiations of the text of Aichi Target 11 at CBD COP10, some actors pushed for a higher numeric target to offset the potential that rebranded OECMs will not be 'real' PAs [20,33]. The IUCN definition attempts to balance this concern with the desire to "recognize and celebrate conservation delivery from a wider range of organizations and individuals than ever before" [52] (p.136). It does so by requiring that OECMs demonstrate effective conservation outcomes in the long-term in order to count towards the Aichi target. This is in contrast to traditional PAs, which are included in the WDPA and therefore count toward conservation targets by virtue of being government sponsored and having explicit conservation management objectives, regardless of whether they are actually fulfilling them.

In marine systems, there are multiple types of area-based management that may count towards Aichi Target 11 as OECMs. In addition to LMMAs and ICCAs, these include areas regulated for navigation (e.g. Particularly Sensitive Sea Areas under the International Maritime Organization), mining (Areas of Particular Environmental Interest under the International Seabed Authority), and fishing (Vulnerable Marine Ecosystems under the Food and Agricultural Organization) [57]. Privately managed areas, sites protected for other purposes (e.g. historical significance or cultural heritage), and areas of habitat restoration may also qualify [52]. However, not all area-based management will be considered an OECM. For example, Laffoley et al. [52] (p.136) caution that rather than attempt to include certain fisheries closures as OECMs, driven by "demand from politicians and leaders to make greater progress against the 10% target defined in Target 11," such measures should be 'counted' toward Aichi Target 6.

Notwithstanding such concerns, there is a tremendous opportunity to support and acknowledge effective and equitable conservation through the recognition of OECMs. According to provisional definitions of the IUCN and CBD, OECMs must be effectively managed to deliver conservation outcomes. In addition, given their alignment with ICCAs and LMMAs, there is the potential for OECMs to support equitable management, if indigenous and/or local rights, governance mechanisms, worldviews, values, and benefits are upheld and enhanced [58]. However, this is not guaranteed. As detailed in Section 4.2, effective and equitable management remain challenging, both to deliver and to measure.

4.2. Effectiveness, equity, and their interactions

Progress on PA area coverage has not been accompanied by progress on other components of Aichi Target 11, including equitable and effective management [59]. Lack of progress comes in three forms. The first is failure to measure. A variety of tools have been developed to assess protected area management effectiveness (PAME), "primarily the extent to which management is protecting values and achieving goals and objectives" [60]. Tools include the WWF-World Bank Management Effectiveness Tracking Tool [61] (and a guide to its use [62]), with adaptations for MPAs specifically [63]. There has been some progress; for example, the recently released Global Database on Protected Area Management Effectiveness includes a list of more than 28,000 protected areas that have been evaluated using a variety of methodologies (https://pame.protectedplanet.net). However, as of 2015 only 17.5% of countries had met the CBD goal (articulated in COP decision X/31) of completing assessments for at least 60% of the total area of PAs by 2015, with many countries reporting PAME assessments for less than 30% of marine areas [64]. Lack of progress can thus be understood as an absence of measurement, even where tools to measure exist.

For those PAs where management effectiveness has been measured, a second form of lack of progress is evident in ineffective management. For PAs that have been evaluated, average management effectiveness scores indicate that many PAs are not effectively managed [65]. A recent global assessment of 433 MPAs found that most fell short on a variety of management effectiveness criteria [66]. Only two MPAs exceeded the threshold for all nine of Gill et al.'s effectiveness and equity criteria. Sub-optimal MPA performance is often tied to insufficient funding and support; during negotiations over Aichi Target 11, many countries from the Global South emphasized the need to ensure PA management is adequately funded as area expansion is problematic without sufficient resources [33]. Two studies provide a glimpse of projected management costs of effectively managed MPAs. Based on an extrapolation of expenditures reported at 83 MPAs, Balmford et al. [67] estimated in 2004 that it would cost US$5–19 billion per year to meet the IUCN goal of conserving 20–30% of the world's oceans in MPAs. In a 2015 study commissioned by WWF, Brander et al. [68] estimated that the total cost of reaching the 10% and 30% targets for MPA coverage ranged from US$45 to US$47 billion and US$223 to US$228 billion respectively, for the period 2015–2050. Their estimates include costs of establishment and operations, as well as opportunity costs from lost fishing.

Projected costs of effective MPA management dwarf amounts currently spent via Official Development Assistance and philanthropy [49]. Although philanthropic spending on MPAs increased in the 2010s, funding of MPAs by some of the traditionally important philanthropies is expected to decrease [49]. In addition, current management costs are often not met. Balmford et al. [67] found that, even though their methods likely selected for well-funded MPAs, only 16% reported sufficient funding for conservation. Similarly, Gill et al. [66] found that 65% of MPAs lacked budgets necessary to support basic conservation and 91% lacked adequate staff. Even if progress is made on evaluating management effectiveness, effective MPA management will likely be the exception rather than the rule, unless significant additional resources are devoted to supporting MPA management. Moreover, the creation of new MPAs may undermine management effectiveness in already existing MPAs, by further stretching limited resources [69]. MPAs can generate revenue and have the potential to play a key role in protecting and maintaining critical ecosystem services, if they are designed and located appropriately [70]. But they cannot do so if they lack the resources for effective management.

The third form of lack of progress is in measurability and its meaning. For example, in their review of the PAME database, Coad et al. [64] critique assessments for relying on subjective and ordinal data (among other things), which make it difficult to assess the links between management effectiveness and biodiversity outcomes. For other components of the target, including the need for equitable management, "no agreed and standardised methodology exists for tracking progress" [59] (p.39). While equity has not been formally defined or operationalized in relation to Target 11, efforts to develop tools for assessing equitable management of PAs are on-going. Equity is understood to include three elements: distribution (of benefits and burdens), procedure (decision-making processes), and recognition (who is acknowledged/included and how) [71–73]. Zafra-Calvo et al. [73] identify a set of ten indicators that could be assessed according to three categories—inequitable, no impact, equitable—while acknowledging the complexity of the task. An important limitation of most existing efforts to assess effectiveness and equity is that they are based on self-assessment by managers, staff and NGOs involved with PA management [64,73]. For equity in particular, a history of negative social impacts on people and the power imbalances that exist between park managers and impacted communities [18] makes self-assessment problematic. If resources to support effective management are largely inadequate, it is

unlikely that resources to more broadly assess, monitor, and improve the equity of MPA management will be sufficient, even if an operable definition and tool should be agreed.

Although equity concerns relate to all PAs, they take on additional meaning in a marine context. First, because MPAs may displace people from marine space and resource use, but not their homes, the equity issues may be seen as less pressing. However, MPAs can impact on fishing livelihoods, reducing food security and access to an important source of protein [41], issues that are particularly critical given the global importance of seafood, particularly in the Global South [74]. The LMPA movement gained momentum in part because, relative to more traditional nearshore MPAs, the spaces they protect were seen as unpeopled; thus, livelihood concerns and conflicts were bypassed and LMPAs were seen as politically more expedient [75,76]. Emerging research suggests this is not true; equity concerns are qualitatively different, but not absent [43,77,78]. In some cases they are profound [79].

A further challenge is to meaningfully consider how the various components of Aichi Target 11 interrelate. For example, effective PA management may be predicated on inequitable management, if meeting biological conservation objectives is contingent upon violent exclusion of people (e.g. [80]). Continued emphasis on expanded area coverage may result in inequitable distribution of burdens and/or inequitable procedures [81] or incentivize protection of politically expedient sites over sites that protect ecosystem services or enhance ecological representativeness [23]. It is unclear how decisions should be made regarding PA establishment and ongoing management, including regarding the allocation of resources, in order to navigate trade-offs among the different components of the target. There is likely to be significant disagreement on this point among those who prioritize biodiversity conservation and those who emphasize the 'people-oriented objectives of MPAs' [81] (p.176), as achieving both effective biodiversity conservation and equitable management may not always be possible [82].

5. Ensuring 'success' for SDG Target 14.5

MPA Target 14.5 of SDG14 is conspicuous in its lack of ambition and complexity relative to previous targets (Table 1) [65]. Both the incentives for MPA expansion (Section 3) and the challenges for realizing some of the more 'qualitative' [82] elements in Aichi Target 11 (Section 4) may explain why SDG Target 14.5 did not incorporate OECMs and effective and equitable management; they have proven to be complicated, contested, and expensive and make success more difficult to achieve and to measure. In articulating a more narrowly scoped but loosely defined area-based target (protected areas are identified in the indicator, but not mentioned in the target itself), one that is relatively easy to assess in terms of progress, the UNGA is more likely to succeed. Indeed, if the CBD's calculations are accepted as correct, the goal of 10% coverage for global oceans will be met 10 years ahead of the SDG schedule (https://www.cbd.int/pa/UN-Ocean-Conference/flyer-en.pdf).

But what will this 'success' mean for MPAs specifically and for ocean conservation more generally? Claiming success based on area coverage alone will be misleading at best, if existing and expanded area coverage consists of MPAs (and/or OECMs) that are neither effectively nor equitably managed. Their omission from Target 14.5 does not make these elements unimportant; their addition to IUCN and CBD targets reflects the efforts of multiple groups with interests in making MPAs 'better', for both environments and people [6,24,33]. Although area coverage is measurable, SMART targets must also be specific [31]. By foregoing inclusion of the additional elements in Aichi Target 11, SDG Target 14.5 is less specific, and therefore less likely to direct action effectively.

It is possible that once area coverage is achieved, MPA proponents will turn their attention to making progress on the 'qualitative' elements. Having reached the agreed upon number—10% in the UNGA and CBD—they may direct their resources to effective and equitable MPA management. Alternatively, there are 9 other targets within SDG14 addressing important ocean conservation issues, some of which (e.g. small scale fishing, plastic pollution) are gaining increased attention on the oceans conservation agenda [7]. It is possible that the effort (and funding) put into MPA expansion over the past decade will be redirected to other components of SDG14. While both of these things may happen, a wholesale shift away from MPAs is unlikely, for the following reasons.

First, many MPA proponents suggest 10% coverage is inadequate. The IUCN has always argued for 30% coverage and, although that number seemed inconceivable in 2003 when less than 1% of the ocean was in MPAs, the expansion success of the last decade makes this figure less far-fetched. Laffoley et al. [52] point to a growing recognition that the "CBD target may well be insufficient to achieve adequate marine conservation" and the IUCN's World Commission on Protected Areas has established a Task Force named 'Beyond the Aichi Targets', the work of which is premised on the understanding that the Aichi Targets were 'interim' and "do not represent what is actually required for humanity to live in sustainable harmony with nature". (https://www.iucn.org/sites/dev/files/content/documents/beyond_aichi_targets_task_force_tors_april_2017.pdf, accessed February 2018). Within the IUCN, 30% may ultimately be replaced with a higher percentage; the 'half-earth' concept and its leading proponent E.O. Wilson were prominent at the 2016 IUCN World Conservation Congress [83].

Second, even if 10% is considered sufficient for total MPA coverage, many MPAs are not protecting ecoregions or ecosystem services; the CBD's most recent assessment of progress to the Aichi Targets concludes that existing MPAs fall short on ecological representation and protection of key biodiversity areas and ecosystem services, and that these components of Target 11 will not be met by 2020 [48]. Further, if OECMs count towards MPA targets, IUCN and other conservation groups may renew pressure for more 'strictly' protected MPAs, to achieve greater biodiversity conservation outcomes [39]. Thus, MPAs will be deemed insufficient in placement and type, rather than absolute coverage, necessitating more strictly protected MPAs in different places.

Third, if the UN successfully negotiates a new UNCLOS implementing agreement that will allow for the establishment of MPAs on the high seas, a higher area coverage target will be essential in order to capitalize on the potential that such an agreement will create. This seems particularly likely given existing predictions that the 10% target will be met by 2020 with or without the UNCLOS implementing agreement. Part of the agreement's legitimacy, indeed the reason it was initially proposed, is the need for high seas MPAs. The likely result is a new high seas specific MPA area coverage target, or a new iteration of a global target with a higher level of ambition (though it is not clear which institution will set this, given the CBD's reluctance to extend its reach beyond the EEZs of member states [24]).

Having adopted a goals-oriented approach to global governance, international institutions need to demonstrate success, however modest, to remain legitimate. For conservation generally and for oceans specifically, MPA area expansion has met that need. Already, in the first report on progress towards SDG 14, MPAs are one of five reporting points and the only one framed in entirely positive terms [25]. Even while institutions like the CBD recognize the limits on what protected areas can achieve for biodiversity conservation [48], PAs remain a privileged solution. However, the legacy of the solution will be determined not only by the spatial extent of MPAs in global oceans, but by the realization of those difficult—to define, implement and measure—'qualitative elements' of effective and equitable management with in MPAs or OECMs. Although the narrowly scoped but loosely defined SDG Target 14.5 is with us until 2030, the Aichi Targets will expire and new CBD targets will be adopted in 2020, and any new UN implementing agreement for biodiversity conservation on the high seas will define its own goals. Given the MPA imperative is likely to

continue, attention to effective and equitable implementation and management seems critical. More importantly, this expanded scope needs to be matched with resources to realize the full ambition of effective and equitable MPAs, in practice, on the ground and in the water, where they impact most directly on biodiversity, the people who are working to conserve it, and the human communities that depend on it.

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None.

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