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A Review of Sustainability Concepts in Marine Spatial Planning and the Potential to Supporting the UN Sustainable Development Goal 14

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Ecosystems all over the world are under increasing pressure from human uses. The UN Sustainable Development Goal 14 (UN SDG 14) seeks to ensure sustainability below water by 2020; however, the ongoing biodiversity loss and habitat deterioration challenge the achievement of this goal. Marine Spatial Planning (MSP) is a developing practice with a similar objective to the UN SDG 14, albeit research shows that most MSP cases prioritize economic objectives above environmental objectives. This paper presents an assessment of how MSP can contribute to achieving the UN SDG 14. Results are presented in three steps. First, a representative definition of MSP is presented. Secondly, activities that can be addressed through MSP are laid out. Lastly, results are used to assess how MSP can contribute to the achievement of the UN SDG 14 targets and indicators. This assessment shows great potential for MSP to play a role in the achievement of the UN SDG 14.

Keywords: maritime spatial planning, ocean planning, ocean governance, sustainable ocean use, marine conservation, ocean sustainability

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INTRODUCTION

The increasing level of interest in the marine space has put severe and diverse pressures on marine ecosystems. For this reason, the United Nations Sustainable Development Goal 14 (UN SDG 14), Life Below Water, was formulated with the objective to "*Conserve and sustainably use the oceans, seas and marine resources for sustainable development*" (UN, 2015). To achieve this purpose, the UN SDG 14 addresses a variety of topics, from marine pollution to ocean acidification, conservation of marine ecosystems, and fishing regulations, among others (see UN, 2021). Still, the 2019 status report on progress toward the SDGs concluded that the level of protection globally is inadequate and incapable of combating the major threats of ocean acidification, overfishing, and eutrophication—even if the number of marine protected areas (MPAs) is growing worldwide. Indeed, it states that "(. . .) *increased efforts and interventions are needed to conserve and sustainably use ocean resources at all levels*" (UN ECOSOC, 2019).

One way of increasing such effort is through marine spatial planning (MSP). MSP has been globally recognized as a way to foster sustainable use of marine ecosystems and to promote ocean conservation (Ehler and Douvere, 2009). As laid out by the European Union Directive on MSP (MSPD), Directive 2014/89/EU, the objective of MSP is to "(. . .) *promote the sustainable growth of* *maritime economies, the sustainable development of marine areas and the sustainable use of marine resources*" (European Commission, 2014). For this reason, the purposes of MSP largely mirror the ones of the UN SDG 14. Indeed, they are both focused on sustainable development of maritime activities and economies while at the same time conserving and ensuring sustainable use of marine areas. By concept, MSP should therefore be able to contribute to the achievement of the SDG 14 (Ntona and Morgera, 2018; Frazão Santos et al., 2020; Calado et al., 2021).

However, research has found ambiguities regarding how MSP should balance objectives for environmental protection and economic development (Douvere and Ehler, 2008; Gilliland and Laffoley, 2008; Maes, 2008; Katsanevakis et al., 2011; Trouillet, 2020). One of the main contributors to such ambiguity is the dichotomous role of MSP in ensuring both environmental and economic objectives at the same time. This ambiguity has resulted in MSP cases predominantly focused on achieving economic objectives before planning for environmental objectives (Jones et al., 2016; Trouillet, 2020). This prioritization supports what is also referred to as *weak sustainability*, as it relies on a fragile foundation if the health of marine ecosystems is not secured. Weak sustainability comes from an economic perception that all capitals are replaceable, i.e., natural capital can be replaced with the right financial or societal capital (Bateman and Mace, 2020). In contrast, planning that ensures environmental sustainability before addressing objectives for economic activities builds a strong and sustainable foundation for marine ecosystems and depending maritime economies, thus aiming for *strong sustainability* (Mee et al., 2008; Frazão Santos et al., 2014). Jones et al. (2016) found vast differences between MSP in theory and MSP in practice, with MSP cases focused on blue growth and economic development being much more prevalent than ecosystem-based MSP focused on a strong sustainability approach (Jones et al., 2016).

This paper aims to further explore and clarify the potential contribution of MSP to achieving SDG 14 and related targets. While doing so, it also aims to decrease the ambiguity regarding the dual role of MSP in supporting both ecosystems protection and human development. These objectives are attained by conducting an in-depth analysis of key literature on MSP, assessing key MSP definitions, and offering examples for concrete action.

MATERIALS AND METHODS

The present study is composed of three main methodological phases, all of them based on the revision of the most cited documents (Scopus database) on both marine and maritime spatial planning. These are: (1) the development of a representative MSP definition; (2) the analysis of the main human uses incorporated or managed in MSP initiatives; (3) the investigation of the contribution of MSP to each target of the SDG 14. Specificities on each phase are provided in the following sub-sections.

First, in order to identify the most applied MSP definitions in scientific literature, the Scopus database was used to search documents that included the terms "marine spatial planning" or "maritime spatial planning" in their title, abstract, or keywords. After reviewing the 50 most cited documents (see **Supplementary Material A**), a pattern in definitions was clear (e.g., literature sources, wording). Most of these 50 documents used secondary sources to defining MSP, in many cases the same ones. These amounted to a total of 30 "defining" documents (see **Figure 1** and **Supplementary Material B**). The 30 defining documents were carefully examined for explicit MSP definitions, which were then extracted for further analysis using Nvivo (2020), and coded based on two overall questions: (1) What is MSP? (2) What is the purpose of MSP? Each of these coding processes led to a list of answers. The most applied elements were then sought combined into one representable definition of MSP. This required some creativity in how to bind all the elements together into one formulation, for which the wording of the coded definitions was used as guidance. In order to test the representativeness of the formulated definition, the latter was compared with a word frequency test (of all definitions from the 30 defining sources) using Nvivo (see **Figure 2** and **Supplementary Material C**). This comparison made it possible to see if any central terms or aspects of MSP were missing from the formulation of the combined MSP definition.

Second, the set of 30 defining documents were manually reviewed for an examination of the human uses and activities that take place in ocean space, and which can be generally addressed and managed through MSP processes (see **Supplementary Material B**). This analysis allows for a comparison of the type of ocean uses and activities that MSP can plan for, and the uses and activities addressed in the SDG 14 targets. Based on the identified human uses and activities, a list of search words (see **Supplementary Material D**) was then established and used to perform a word count for the 50 most cited MSP-related documents, in order to assess which ocean uses gathered the most attention.

Finally, by using the results of the first two stages, a qualitative analysis was developed to unravel the potential contribution of MSP to achieving SDG 14 (see **Figure 1**). This analysis used a list of search words related to each of the 10 SDG 14 targets (see **Supplementary Material E**) and focused on a manual review of the 50 most cited MSP documents—which were investigated regarding how MSP could contribute to achieving each of the targets. Additional relevant sources were also consulted for guidance about which specific actions could be undertaken by MSP initiatives, especially when considering the set of ocean uses MSP can plan for.

RESULTS

Defining Marine Spatial Planning

The in-depth analysis of the 30 defining MSP documents resulted in a list of terms commonly used to describe "what MSP is," some of which being more often referred (**Figure 3**). The most common terminology—mentioned in 11 defining documents—described MSP as being some type of "process" (either in general terms, or specifically as a planning or public process). In addition,

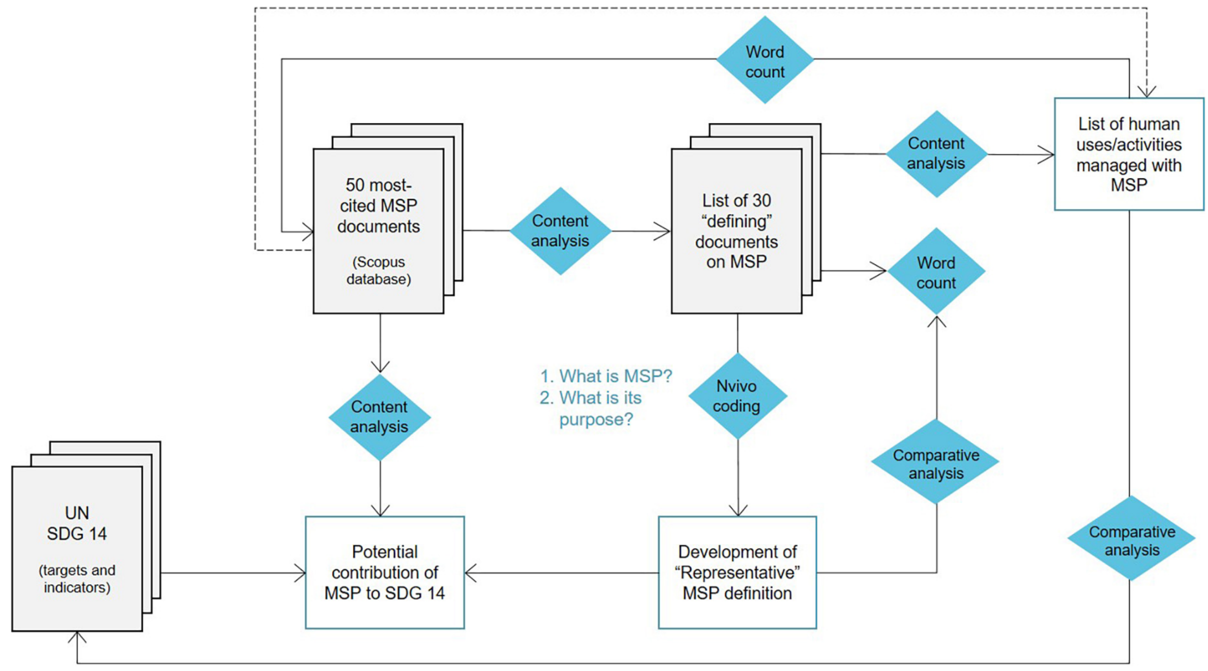

FIGURE 1 | Illustration of the methodological process used to establish a representative MSP definition, analyze human uses addressed in MSP, and investigate the contribution of MSP to each target of the SDG 14.

5 documents described MSP as being a type of "management," and 3 documents as a way to implement the ecosystem-based approach (EBA) [albeit there are some disagreements as to whether MSP implements EBA or is part of ecosystem-based management (Kirkfeldt, 2019)].

By combining the most applied terms, a preliminary MSP definition could be described as follows:

*"Marine spatial planning is **a public, planning process** and an **element of ecosystem-based sea use management**."*

During this preliminary search, the multifunctional purpose of MSP became vivid, with the 30 defining documents providing a long list of purposes for MSP (**Figure 4**). A shared element of the listed purposes was the focus on human uses and maritime activities, namely concerning solving potential conflicts among uses and between uses and the environment. A peculiar aspect, especially relevant when considering the role of MSP in achieving SDG 14, is that purposes including the words "sustainability" or "sustainable" are not among the top purposes in **Figure 4**. Indeed, among the 21 identified purposes, "Support sustainable development" and "Manage activities more sustainably" appear only in the 12th and 21st positions, respectively. Still, some of the most frequently mentioned purposes also relate to sustainability concepts. The latter is the case of the purposes "Achieve ecological, economic and social objectives" (the second most identified one, mentioned in 13 out of the 30 documents, and which addresses the three pillars of sustainable development) and "Sustain ecosystem services" (the fifth most identified purpose, identified in 7 out of the 30 documents).

Adding the purpose to the summarized description obtained earlier, MSP could be described as:

*"Marine spatial planning is **a public, planning process** and **an element of ecosystem-based sea use management,** that aims to prevent **conflicts among maritime uses and between human uses and the environment,** through a **strategic** and **rational, spatial and temporal, distribution of activities** in order **to achieve environmental, social and economic objectives,** such as **sustaining ecosystem services** and **improve decision-making.** The process involves the implementation of **environmental protection,** the facilitation of **co-location of compatible** uses, and the assessment and management of **cumulative impacts**."*

When comparing the formulation above with the word frequency test performed on the MSP definitions from the 30 defining documents, it became evident that this formulation was a valid representation of the word cloud (**Figure 2**).

The absence of sustainability concepts is, however, again evident. In effect, not a single sustainability concept appears among the 40 most applied words that constitute the word cloud. The word "sustainable" is the 95th most cited word, and therefore not displayed in the word cloud. By contrast, in the MSPD there is a substantive emphasis on sustainability. The word "sustainable" is the 11th most cited word (when excluding the term "maritime spatial planning"), being written 25 times over 11 pages (Kirkfeldt et al., 2020) and being the second most cited environmental-related word (Frazão Santos et al., 2015).

Human Activities and Uses to Address Through Marine Spatial Planning

The list of human uses and activities mentioned in the 30 defining documents is displayed in **Figure 5**, together with the

FIGURE 2 | Word cloud generated by Nvivo based on the definitions of MSP found in the 30 defining documents. The words "marine," "spatial," and "planning" were excluded from the word frequency analysis to not influence results. The size of each word represents the percentage of all citations relative to the other words. Baseline data can be found in **Supplementary Material C**.

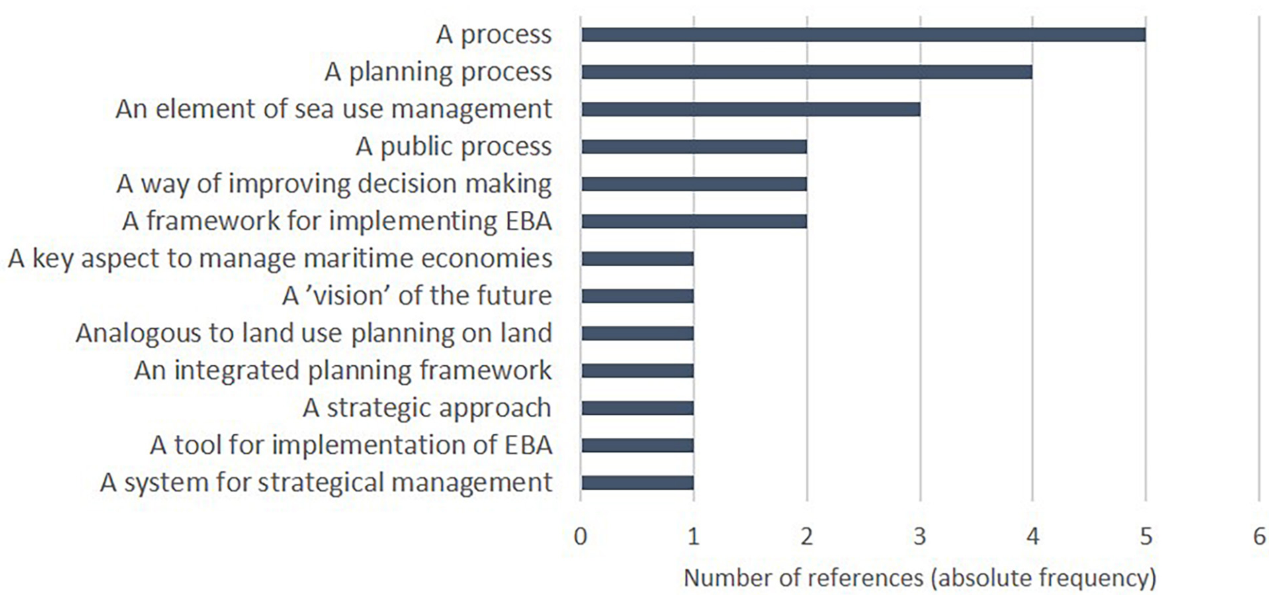

FIGURE 3 | Main definitions of what MSP is, found in the 30 "defining" documents. Five out of the 30 documents only defined what MSP does and not what MSP is. For that reason, they are not reflected into the graphic. Baseline data in **Supplementary Material B**.

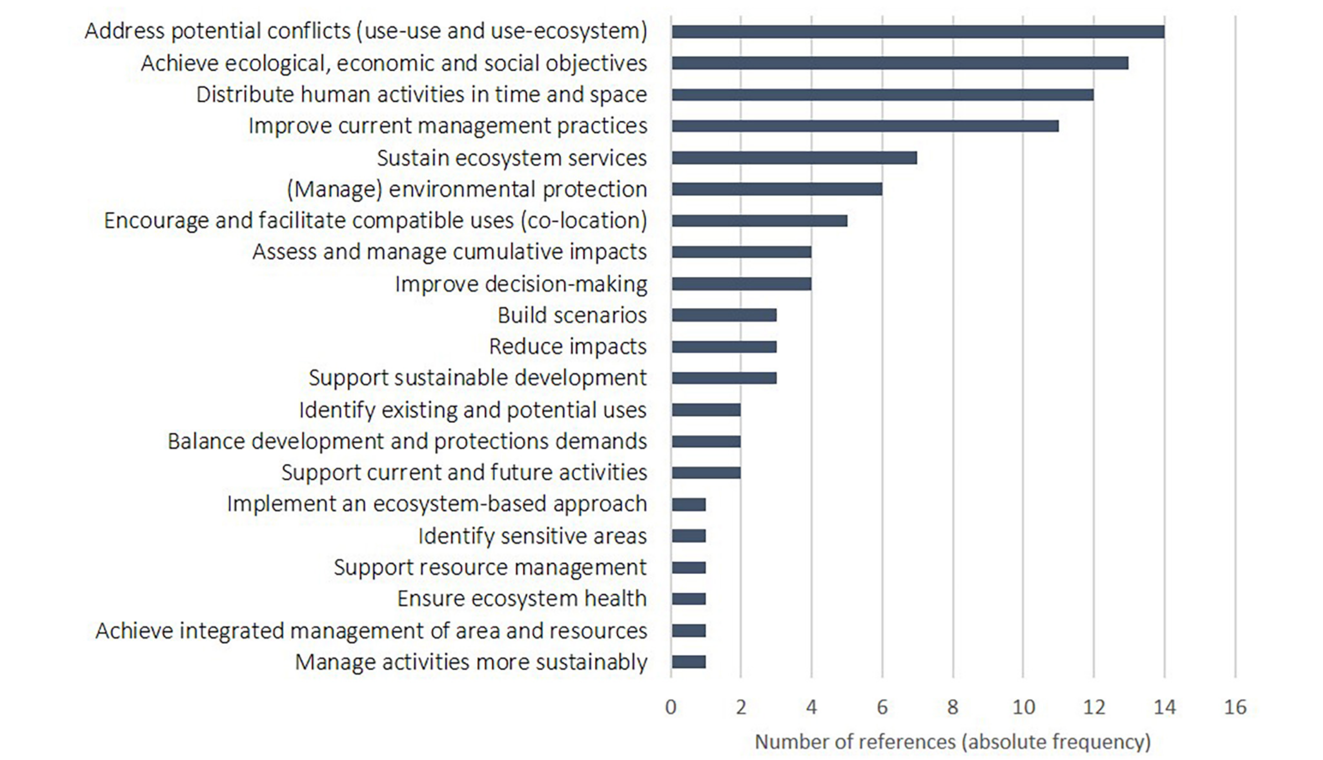

FIGURE 4 | Purposes of MSP found in the 30 "founding" documents and the number of times each purpose appears in such documents. Baseline data in **Supplementary Material B**.

corresponding word frequency results for the 50 most cited MSP documents. The list of uses and activities in **Figure 5** is diverse, and spans from on-shore, coastal activities (e.g., tourism, ports, and harbor activities) to off-shore activities (e.g., renewable energy, oil and gas activities, shipping, off-shore aquaculture). Many of these activities also correspond to sectors that were traditionally managed separately and through different institutional setups (Maes, 2008). Moreover, while some activities are managed nationally, others have a more transboundary nature. For example, where tourism is mainly managed at the country level, shipping and fishing activities are also managed through international frameworks, such as the International Council for the Exploration of the Seas (ICES, 2020) and the International Maritime Organization (IMO, 2020) (Blundell, 2004; Maes, 2008).

The word count showed that some activities receive much more attention in the MSP context. The most cited uses of the ocean space are those related to marine conservation and protection, renewable energy activities, and fishing (**Figure 5**). These activities are all known to be prone to conflicts, either among themselves or between them and other activities or stakeholders. Conflicts among the three activities can occur, for example, when fisheries are excluded from a new protected area or from a wind farm area (Agardy et al., 2011; White et al., 2012). Conflicts with stakeholders and other activities are often seen in relation to the establishment of a new wind farm, where conflicting interests of coastal residents and shipping and recreational activities exist (Ehler and Douvere, 2009; White et al., 2012). The level of potential conflicts surrounding these activities might explain the high citation numbers in the analyzed literature.

The Role of Marine Spatial Planning in Achieving SDG 14

The limited use of sustainability concepts in MSP definitions (discussed in section "Results") is noteworthy and especially relevant when considering the contribution of MSP to achieving SDG 14. This raises the question: Can MSP play an important role in achieving SDG 14, despite the lack of sustainability focus in the studied "defining" MSP documents? We address this question by analyzing the links between MSP and each SDG 14 target, as presented below and summarized in **Table 1**.

Target 14.1. Marine Pollution

The first SDG 14 target points to a sensitive issue in MSP. First, being a "spatial" practice, to which extent can MSP regulate pollution from sectoral activities? Second, being a "marine" practice, what is MSP potential to address land-based pollution sources? The indicator of target 14.1 is composed of two separate sub-indicators: (a) an index of coastal eutrophication; and (b) floating plastic debris density. Eutrophication is strongly linked to nutrient runoff from agricultural activities, and plastic debris has been found to derive primarily from land-based sources (c. 80% Jambeck et al., 2015; Sherrington, 2016). While the UN

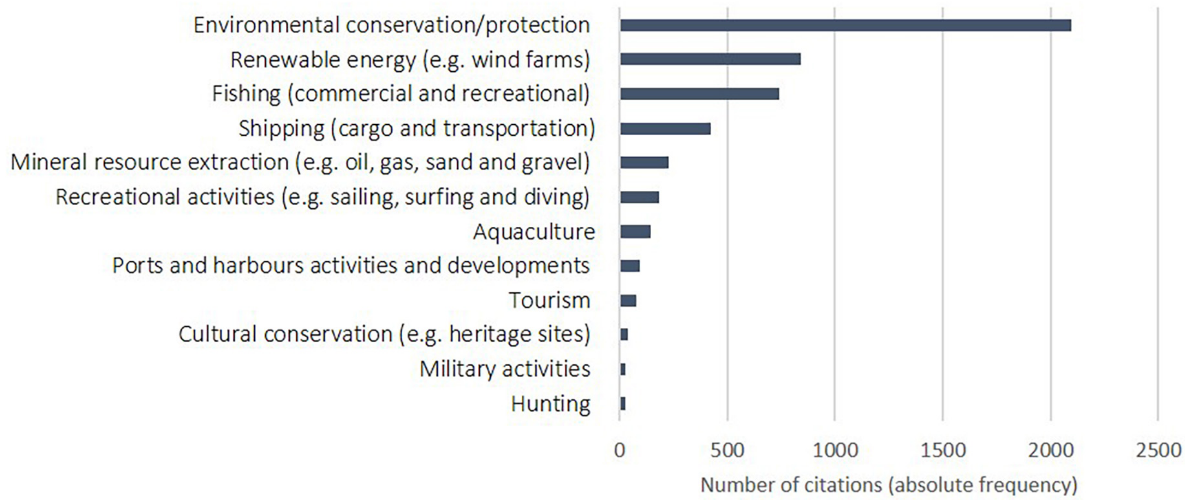

FIGURE 5 | A word count on key activities that can be addressed through MSP.

considers eutrophication—together with overfishing and ocean acidification—to be a key impact that is impossible to address with the current level of protection at sea (REF), the need to address land-based sources of pollution is highlighted. In one of the 30 defining MSP documents, the authors suggested that MSP can play a role in formulating regulations for "*the amount of fertilizers and pesticides applied to agriculture lands*"(Ehler and Douvere, 2009). Ehler and Douvere (2009) suggest this as a non-spatial management measure that might be necessary, albeit seldom applied, to achieve MSP objectives. However, the role of MSP in addressing what is called "land-sea interactions" (LSI) has been a topic for much debate and confusion. Indeed, in 2017 MSP practitioners met at a conference to discuss how to address land-sea interactions in MSP (Kidd et al., 2019). The practice of addressing LSI in MSP is, however, still limited and highly debated. Full integration of terrestrial and marine planning systems has been suggested as a way to facilitate better considerations for LSI, but it bears a number of challenges (Kidd and Ellis, 2012; EC, 2017; Kidd et al., 2019). While pollution from land is a dominant impact on marine ecosystems, marine pollution also derives from maritime activities (e.g., lost fishing gear and oil spills). It has been suggested that MSP could address the amount of lost fishing gear by making restriction zones for specified types of gear (e.g., bottom trawls) (Blundell, 2004), and that MSP could coordinate with risk and vulnerability analyses related to oil spills due to the shared spatial dimension of the two processes and a similar demand for data (Frazão Santos et al., 2013).

Target 14.2. Manage and Protect Marine and Coastal Ecosystems

To avoid adverse impacts on the marine environment, this target aims for a sustainable management and protection of marine and coastal ecosystems. The aim of target 14.2 is in line with the initial purpose of MSP, as exemplified for example by the case of the Great Barrier Reef Marine Park. The practice of MSP was originally considered (and is today still) a means to implement ecosystem-based management (Douvere, 2008)—as seen in the coded definitions. By implementing EBA, MSP could play a key role in achieving target 14.2, as the indicator pertains to the "*number of countries using ecosystem-based approaches to managing marine areas*" (UN, 2021). Indeed, three of the most cited "purposes" of MSP, as displayed in **Figure 4**, are related to target 14.2 (namely, manage "environmental protection," "assess and manage cumulative impacts," and "reduce impacts"), all of them being key elements of EBA (Kirkfeldt, 2019). As suggested by the "defining" documents (e.g., Blundell, 2004; Ehler and Douvere, 2007; Douvere, 2008), this indicates a high potential for MSP to contribute to target 14.2. The assessment of cumulative impacts has also been identified as of high importance if MSP is to prevent adverse environmental impacts (Halpern et al., 2008). Indeed, MSP can play a key role in reducing impacts on the marine environment through spatial restrictions (e.g., restrictions toward the use of bottom-trawling gear in certain areas), or restrictions of the total extent/intensity of high impact activities such as fishing, oil and gas extraction, and shipping (Blundell, 2004; Ehler and Douvere, 2009).

Target 14.3. Minimize and Address the Impacts of Ocean Acidification

Ocean acidification takes place because of the rising concentration of carbon dioxide in the atmosphere, which is absorbed by, and thus acidifies, the ocean (IPCC, 2019). While climate change in general is often neglected in MSP process, there are several potential pathways for how MSP can minimize and address climate-related impacts, including the ones from ocean acidification (Frazão Santos et al., 2020). Target 14.3 focuses on reducing and addressing the impacts of acidification, and this can include actions for climate change mitigation such as the development of wind farms. Indeed, by supporting the development of renewable energy production, allocating areas to blue carbon capture and storage, or limiting available space

TABLE 1 | Potential contribution of MSP initiatives to meeting each of the 10 targets of the UN SDG 14 (see detailed information in section "Discussion and Conclusion").

UN SDG 14 targets	Actions to be carried in MSP initiatives
Prevent and significantly reduce marine pollution of all kinds (Target 14.1)	• Encourage and support full integration with terrestrial planning • Exclusion of bottom-trawling activities from certain areas to prevent lost fishing gear • Cooperation with risk and vulnerability analyses carried for human hazards such as oil spills • Contribute to regulations for the amount of fertilizers and pesticides applied to agriculture
Sustainably manage and protect marine and coastal ecosystems (Target 14.2)	• Apply an ecosystem-based approach • Assess cumulative impacts • Establish spatial restrictions for high impact activities (e.g., fishing, oil and gas extraction or shipping) in particularly important marine areas • Allocate marine space for conservation areas
Minimize and address the impacts of ocean acidification (Target 14.3)	• Contribute to a green transition by prioritizing renewable energy developments (e.g., wind, wave and tidal) and reducing high-CO2 emitting activities (e.g., oil and gas, shipping) • Contribute to increased resilience of ecosystems by reducing non-climate human pressures (e.g., from pollution, overfishing and habitat losses)
Effectively regulate harvesting and end overfishing, illegal, unreported and unregulated fishing (Target 14.4)	• Establish "no-take" marine zones • Establish "trawling-free" marine zones • Regulate fishing activities through non-economic incentives and regulations (e.g., by setting limits for allowable catches) • Discourage IUU fishing activities (e.g., by establishing artificial reefs)
Conserve at least 10 per cent of coastal and marine areas (Target 14.5)	• Support the establishment of marine protected areas (MPAs) in at least 10% of the marine area • Ensure that MPAs are ecologically beneficial • Ensure proper monitoring and enforcement of MPAs
Prohibit certain forms of fisheries subsidies (Target 14.6)	• Combat IUU and overfishing through initiatives mentioned in target 14.4
Increase the economic benefits to Small Island developing States and least developed countries from the sustainable use of marine resources (Target 14.7)	• Support the development of sustainable fishing practices (e.g., by establishing MPAs, no-take zones or trawling-free zones to ensure healthy fish stocks) • Prioritize the allocation of space to eco-tourism • Prioritize zones for less polluting aquaculture activities (e.g., cultivation of seaweed, oysters, and mussels)
Increase scientific knowledge, develop research capacity and transfer marine technology (Target 14.a)	• Identify knowledge gaps when assessing environmental impacts and ocean health • Use geo-technologies such as remote sensing and GIS for the generation of new data and development of technologies • Make data and technologies available for other usage and further development
Provide access for small-scale artisanal fishers to marine resources and markets (Target 14.b)	• Prioritize areas to small-scale fisheries • Facilitate access to markets through stakeholder involvement and capacity building
Enhance the conservation and sustainable use of oceans and their resources by implementing international law (Target 14.c)	• Develop marine spatial plans in compliance with UNCLOS

for high-emission activities (Frazão Santos et al., 2020), MSP can play a key role in national strategies for climate change mitigation and thus the reduction of ocean acidification. Adverse impacts from acidification on marine species include reduced calcification and growth rates in skeletons and shells, changes in metabolism and in ecological connectivity (Committee on the Development of an Integrated Science Strategy for Ocean Acidification Monitoring, 2010; IPCC, 2019). These impacts influence the services that marine ecosystems deliver, something that MSP is intended to protect according to seven of the 30 defining MSP documents (see **Figure 4**). Ensuring healthy ecosystems and a good environmental status becomes even more relevant in face of climate change, as it provides for more resilient ecosystem components, thus increasing the chance of survival and potential adaptation to a more acidic environment (Committee on the Development of an Integrated Science Strategy for Ocean Acidification Monitoring, 2010). MSP can also contribute to such resilience by reducing non-climate related impacts from for example pollution, overfishing and habitat loss (Ehler and Douvere, 2009; Frazão Santos et al., 2020; Rilov et al., 2020). Increasing ecosystem resilience is part of target 14.2, and actions in MSP to increase ecosystem resilience will therefore support both the achievement of targets 14.2 and 14.3.

Target 14.4. Effectively Regulate Harvesting and End Overfishing, Illegal, Unreported and Unregulated Fishing, and Destructive Fishing Practices

The fourth target of the SDG 14 puts focus on the management of fishing activities with the goal to prevent the depletion of fish stocks. MSP can regulate the type and intensity of fishing activities within specified areas. No-take zones and zones where certain fishing equipment is not allowed (such as bottom trawls) have been found effective in securing benefits for both conservation and fishing (Blundell, 2004). While the creation of specific zones is one way that MSP can contribute to the achievement of target 14.4, indicator 14.4.1 focuses on the "*Proportion of fish stocks within biologically sustainable levels*" (UN, 2021) which indicates the need for a more holistic management of fishing activities—something that cannot be ensured solely through zoning. In addition to zoning procedures, MSP has been suggested to regulate fishing activities by supporting the implementation of non-economic incentives and regulations (e.g., setting limits for allowable catches) (Ehler and Douvere, 2009). While illegal, unreported and unregulated (IUU) fishing activities are difficult to manage through any planning or management initiative—MSP included—some spatial actions have been found to change IUU fishing activities indirectly. This is the case, for example, of establishing artificial reefs, which discourage potential IUU trawling in the area (Bishop et al., 2017).

Target 14.5 Conserve at Least 10 Per Cent of Coastal and Marine Areas

Conservation was the most cited use of the ocean space in section "Discussion and Conclusion" (**Figure 5**), and is seen as a key activity in MSP. A widespread way to ensuring conservation at sea is through the establishment of marine protected areas (MPAs). MPAs are, as well, the measuring factor of indicator 14.5.1: "*Coverage of protected areas in relation to marine areas*" (UN, 2021). MPAs can be defined as an area "*which has been reserved by law or other effective means to protect part or all of the enclosed environment*" (Lascelles et al., 2012), and are generally considered as one of the most effective conservation tools (Maes, 2008; Agardy et al., 2011). Initially, the practice of establishing MPAs was a key inspiration for the development of MSP practice (Douvere, 2008) and is now seen as a key element to ensuring an ecosystem-based approach in MSP (Ardron et al., 2008; Katsanevakis et al., 2011; Rilov et al., 2020). However, research on MPAs shows that many protected areas do not have the intended conservation effect, and that MPAs are not able to ensure ocean sustainability if not combined by other measures (Reimer et al., 2020). This can occur for several reasons, from poor management to issues in the initial scoping and design of protected area (Agardy et al., 2011). MSP can play a vital role in addressing some of these challenges and improving the current practice of MPAs (Agardy et al., 2011; Rilov et al., 2020), thus further contributing to target 14.5.

Target 14.6 Prohibit Certain Forms of Fisheries Subsidies

None of the analyzed literature suggested MSP as an ideal tool to the management of fisheries subsidies. This could be because of a clear lack of a spatial dimension in target 14.6. However, this target is strongly linked to target 14.4 (on the regulation of overfishing and IUU fisheries). Both targets aim to reduce the overall pressure from fisheries, with indicator 14.4.1 being dedicated to the status of fish stocks, and indicator 14.6.1 being more focused on management measures: "*Progress by countries in the degree of implementation of international instruments aiming to combat illegal, unreported and unregulated fishing*" (UN, 2021). While indicator 14.6.1 does not focus on the prohibition of certain subsidies, it does focus on the implementation of instruments to combat IUU. As the latter was considered as challenging, but not impossible for MSP to contribute to under target 14.4, it might constitute an indirect pathway to further contributions of MSP to target 14.6.

Target 14.7 Increase the Economic Benefits to Small Island Developing States and Least Developed Countries From the Sustainable Use of Marine Resources

Target 14.7 is the third target of SDG 14 to address fishing activities, the second most referred ocean use in section "Discussion and Conclusion" (**Figure 5**), with indicator 14.7.1 focusing on the economic development of sustainable fisheries: "*Sustainable fisheries as a percentage of GDP in small island developing States, least developed countries and all countries*" (UN, 2021). Small Island Developing States (SIDS) account for ca. 30% of the worlds' exclusive economic zones, and have thus a tremendous influence on the well-being of marine ecosystem globally. SIDS are extremely dependent on the ocean, and strongly rely on the ocean resources for human wellbeing and livelihood. Fishery is the primary economy in many SIDS and is intrinsic to their culture and lifestyles (Jumeau, 2013). However, target 14.7 goes further, focussing on activities other than fishing, such as sustainable aquaculture and tourism, to support the increase in economic benefits to SIDS and least developed countries. Fisheries, aquaculture and tourism are human activities commonly managed through MSP (**Figure 5**), and activities that rely on healthy ecosystems. The establishment of spatial restrictions (e.g., no-take protected areas, trawling-free zones) can therefore play an important role in supporting their sustainable development. For example, the definition of zones to the development of ecosystem-friendly tourism activities can provide important revenues, as well as better conditions for sustainable fishing activities (Douvere, 2008; Arkema et al., 2015). MSP can also facilitate the development of aquaculture in a strategic manner, by planning for a varied selection of aquaculture types and prioritizing least polluting activities, such as the cultivation of seaweeds, oysters and mussels (Guerry et al., 2012). However, due to the connectivity of the ocean and the mobility of marine species, local human activities depend largely on the activities that take place further off-shore (Gee and Zaucha, 2019). It is therefore important to consider the indirect contribution of MSP to target 14.7 through the role played in regards to other targets (e.g., targets 14.4 and 14.5).

Target 14.a. Increase Scientific Knowledge, Develop Research Capacity, and Transfer Marine Technology

Target 14.a focuses on increasing scientific knowledge and research capacity, in order to improve ocean health and marine biodiversity contribution to the development of developing countries, and is evaluated based on indicator 14.a.1 on the "*Proportion of total research budget allocated to research in the field of marine technology*" (UN, 2021). As MSP is a highly data-demanding practice, it often involves a large extent of data collection and analysis (Ehler and Douvere, 2009). MSP requires data on existing habitats, flora and fauna, existing and future maritime activities, and expected ecological, social and economic changes (including from climate change). Such data can be generated through geo-technologies such as remote sensing and data analysis in geographic information systems (Douvere, 2008; St. Martin and Hall-Arber, 2008). Thus, as formulated by Douvere (2008), MSP "*provides a management framework for new* *and previously inaccessible scientific information.*" It is therefore an ideal gateway for meeting 14.a, basing on the premise that data and technologies generated in MSP processes are made available to other usage and broader ocean management contexts. As target 14.a has a specific aim "*to enhance the contribution of marine biodiversity to the development of developing countries, in particular small island developing States and least developed countries*"(UN, 2021), the process of resource demanding data collection for MSP is an issue. As scientific research can be very costly, SIDS are more restricted than other states in meeting this target (Ehler and Douvere, 2009; Ehler, 2013; FAO, 2014).

Target 14.b. Provide Access for Small-Scale Artisanal Fishers to Marine Resources and Markets

Target 14.b is evaluated based on the "*Progress by countries in the degree of application of a legal/regulatory/policy/institutional framework which recognizes and protects access rights for small-scale fisheries*" (indicator 14.b.1). Because of its intrinsic characteristics, MSP can constitute such a framework. The most obvious role of MSP in this matter pertains to ensuring spatial access of small-scale fisheries to marine resources, for example, by establishing zones where only recreational and artisanal fishing are allowed, or where they have priority over other ocean uses (Blundell, 2004). However, MSP can also facilitate better access to markets, for example, by promoting communication among stakeholders. Stakeholder meetings, a key element of MSP, can bring actors in the fishing industry together, which in turn might facilitate new agreements and collaborations between small-scale fishers and market holders (Gopnik et al., 2012; Lewison et al., 2015).

Target 14.c. Enhance the Conservation and Sustainable Use of Oceans and Their Resources by Implementing International Law as Reflected in UNCLOS

The last target of SDG 14, target 14.c, focuses on nations implementation of international law, according to what is established in the United Nation Convention on the Law of the Sea (UNCLOS). Although UNCLOS does not refer to MSP as a concept, it does consider spatial planning as a facilitating tool that allows some countries to fulfill obligations within UNCLOS (Ardron et al., 2008; Maes, 2008). Indeed, the spatial boundaries set by UNCLOS, such as Territorial Waters and Exclusive Economic Zones, together with specifications for domestic rights within each zone, confirms the potential role to be played by MSP in managing marine resources (both living and non-living) within national jurisdictions (Papageorgiou and Kyvelou, 2018). While there is also a strong push for developing MSP initiatives in areas beyond national jurisdiction (Wright et al., 2019), international initiatives in the high seas are still scarce making MSP a predominantly national-level activity (Ardron et al., 2008). When considering the close connections between the legal framework of UNCLOS and MSP, especially in an ecosystem-based context, it can be said that any country with ongoing MSP initiatives is "*making progress in (. . .) implementing (. . .) ocean-related instruments that implement international law*" with the aim to "*enhance the conservation and sustainable use of oceans and their resources*" (UN, 2021) thus contributing to target 14.c.

DISCUSSION AND CONCLUSION

It is clear from this study that the practice of MSP can play an important role in ensuring sustainability for life below water and achieving SDG 14. However, it also became clear that while MSP is an ideal tool for some SDG 14 targets, others cannot be properly addressed through MSP and require alternative management approaches. In particular, spatial management measures like the establishment of conservation areas, such as MPAs, and restriction zones for fisheries, such as no-take zones or trawl-free zones, can contribute to the achievement of six out of the 10 SDG 14 targets.

Targets with a spatial dimension—such as targets 14.2 on sustainable ocean use, 14.5 on establishing MPAs, or 14.7 on fisheries, tourism and aquaculture in SIDS and least developed countries—are highly compatible with MSP practice. Indeed, the establishment of areas where certain types of fishing are prohibited would help in meeting several targets simultaneously (e.g., targets 14.2, 14.4, 14.5, 14.6, and 14.7), whereas the establishment of MPAs would contribute, both directly and indirectly, to meeting targets 14.2, 14.5, and 14.c. By contrast, targets that require non-spatial regulations such as target 14.6 on fisheries subsidies, or that address topics that go beyond the marine realm such as target 14.1 on marine pollution from land-based activities, can be more challenging to address through MSP. Indeed, while target 14.1 emphasizes the importance of considering land-sea interactions in MSP and ensuring ecosystems resilience to better endure impacts from marine pollution, ensuring this connection in practice is commonly challenging (Schlüter et al., 2020). In order to ensure a sustainable ocean, it is, however, necessary to address the problems from all angles. Actions should be ecosystem-based and should be coordinated holistically on a larger scale (Gjerde and Vierros, 2021). While the achievement of the UN SDG 14 has been estimated to be costly (Johansen and Vestvik, 2020), it is unfortunate that some of that largest challenges related to the ocean (such as loss of biodiversity) is to be found in the EEZ of developing states, of which many are highly reliant on the ocean to sustain livelihoods (Techera and Appadoo, 2019). This further emphasizes the importance of having a global and holistically coordinated effort, for which MSP could be a helpful tool.

But while this research supports the relevance of MSP to SDG 14, it also acknowledges that the current practice of MSP rather prioritizes the achievement of economic objectives against environmental goals (although some MSP cases are truly ecosystem-based) (Trouillet, 2020). Indeed, the assessment of MSP definitions showed a minimal attention to sustainability objectives and a high focus on how to manage human uses and potential conflicts, indicating a weak sustainability approach. This economic focus is reflected in the word cloud based on MSP definitions (**Figure 4**), in which the words "uses" and "activities" were the most frequently cited, and the words "ecosystem" and "sustainability" were far less predominant. The different prioritization of environmental and economic objectives in MSP practices is not new, and mirrors the ongoing debate of whether MSP is an abbreviation for "marine" or "maritime" spatial planning. While some use "marine" to indicate that the planning practice is ecosystem-based, and thus limited by ecosystem limits (with strong sustainability objectives), "maritime" is often used in EU contexts (as in the MSPD) or to emphasize the cross-sectoral character of MSP (Mee et al., 2008; Gilbert et al., 2015; Gee and Zaucha, 2019). While the choice of concepts does not in itself guarantee a particular outcome, the values associated with the terminology may play a role when objectives are set, and whether these aim for strong or weak sustainability objectives (Mee et al., 2008). Thus, despite its conceptual relevance to SDG 14, current MSP practices and definitions show that MSP is not yet fulfilling its full potential.

We are currently living in the period of history with the largest deterioration of nature, and the trend is accelerating (Diaz et al., 2019). The latest report from the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services estimates that the current rate of species extinction is at least tens to a hundred times higher than it has ever been over the last 10 million years (Diaz et al., 2019). This extensive loss of biodiversity not only reduces ecosystems ability to deliver provisioning services, such as food, but it also decreases ecological resilience to overcome other anthropogenic threats such as climate change (Diaz et al., 2019; Dinerstein et al., 2020). Not only does the ocean provide livelihoods and income for humans, it also supports human wellbeing through non-monetary values, and is in many countries central to both socioeconomic and cultural dimensions (Allison et al., 2020). The current biodiversity loss can lead to various undesirable futures depending on the actions, strategies and plans we make today (Armstrong, 2020; Wyborn et al., 2020). This, together with the increasing need to achieve the UN SDG 14 for life below water emphasize the importance of implementing effective ecosystem-based MSP initiatives, with strong sustainability objectives that prioritize the health and resilience of the ocean above the achievement of blue growth objectives.

DATA AVAILABILITY STATEMENT

The original contributions presented in the study are included in the article/**Supplementary Material**, further inquiries can be directed to the corresponding author/s.

AUTHOR CONTRIBUTIONS

TK carried out initial research design, data collection, analysis, and writing. CFS carried out writing and revision of the draft manuscripts. Both authors contributed to the article and approved the submitted version.

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SUPPLEMENTARY MATERIAL

The Supplementary Material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fmars.2021.713980/full#supplementary-material

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