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Review

How to Incorporate Cultural Values and Heritage in Maritime Spatial Planning: A Systematic Review

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Abstract: Understanding aspects of maritime/underwater cultural heritage (MUCH) and the associated cultural values and integrating them into maritime spatial planning (MSP) processes is a new global challenge alongside the rapid increase in human activities at sea and climate change impacts on the seas and the oceans. This article highlights the significance of cultural values in shaping human interactions with marine environments and how MSP can address the cultural dimensions of marine resources management. The key research question addresses the prerequisites and methods for a better incorporation of MUCH in the MSP processes. This review revealed a diversity of literature addressing the inclusion of MUCH in (a) coastal and marine management but also in (b) marine/maritime spatial planning (346 articles from the Scopus database). In the first case, there is a strong focus on cultural ecosystem services (CES) and cultural values, the role of indigenous and local communities, the transfer of traditional ecological knowledge, and participatory approaches and tools. As for the latter, this review demonstrated quite a lot of relatively recent MSP endeavors that seem to be influenced by the above approaches identified in the coastal and marine management literature. This article concludes that for MSPlans to be innovative and mainly acceptable by local communities, the "missing layer" of socio-cultural values and data is indispensable. Furthermore, a collaborative MSP between governments and regional/provincial authorities may boost sustainable blue activities while preserving ecological and cultural values.

Keywords: maritime spatial planning; coastal/marine management; socio-cultural values; cultural ecosystem services; participatory approach; local communities; indigenous knowledge

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1. Introduction

Maritime spatial planning (hereinafter MSP), coastal planning, marine policy, and coastal policy have a lot to learn from sustainable coastal/marine resource management. These planning and policy approaches aim to balance environmental, economic, and social considerations in decision making concerning the allocation of maritime uses. However, considering cultural and historical values in MSP and marine policies is still a relatively new area. The present literature review explores the intersection between maritime/underwater cultural heritage (MUCH), including tangible and intangible heritage, cultural ecosystem services (CES), cultural values, and socio-cultural values in the context of MSP.

According to [1], "MCH is made up of finite and non-renewable cultural resources including coastal or submerged prehistoric and indigenous archaeological sites and landscapes, historic waterfront structures, the remnants of seagoing vessels, and the maritime traditions and lifeways of the past and present". Hence, "maritime cultural heritage" means both material, cultural goods (in water and on land) and immaterial ones, such as representations, perceptions, discourses, practices, material culture, customs, traditions, imageries, and cultural landscapes, that are expressions of maritime culture and of the relationship between people, the sea, and their surroundings that possess a cultural, emotional, or use value, among others.

Furthermore, by its nature, "underwater cultural heritage" (UCH) is only related to tangible assets and resources. As explained above, the term "maritime cultural heritage" is used when intangible assets are also considered. It is noteworthy that other relevant terms broader than those described above can be also used, such as "coastal cultural heritage", which includes maritime and underwater assets, as well as terrestrial ones, such as historic waterfront buildings, lighthouses, military fortifications and structures, waterfront residential homes, and mill buildings [1]. During the second half of the 20th century, underwater cultural heritage received a distinct place in the definition of "cultural heritage", which resulted in widening the scope of assets and resources demanding protection [2,3]. Indeed, "maritime archaeology" or "underwater archaeology" began to evolve as a separate discipline of archaeology in the early 1960s, thus stimulating an ever-increasing interest in establishing the legal framework for its protection, as well as for salvage and ownership rights, in case of accidental location [4].

The UNESCO Convention on the Protection of Underwater Cultural Heritage [5] (2001) defines "underwater cultural heritage" as "all traces of human existence having a cultural, historical or archaeological character which have been partially or totally underwater, periodically or continuously, for at least 100 years such as: (i) sites, structures, buildings, artefacts and human remains, together with their archaeological and natural context; (ii) vessels, aircraft, other vehicles or any part thereof, their cargo or other contents, together with their archaeological and natural context; and (iii) objects of prehistoric character". The Convention is innovative in that it considers the two components of heritage that were to date classically opposed, i.e., natural and cultural, thus naming a wide range of UCH assets with the two main criteria of "Time" (giving a 100-year limit) and "Significance" (distinguishing UCH assets as cultural, historical, or archaeological).

As MSP is taking off worldwide as a holistic and place-based approach to maritime planning and management and as a tool for the implementation of the renewed Blue Economy under the European Green Deal framework [6], there has been a growing need for the inclusion of socio-economic factors in this process. This is highlighted in the new, very recent Communication for a Sustainable Blue Economy in the EU, "Transforming the EU's Blue Economy for a Sustainable Future" [7]. However, there is a deficiency of socio-cultural evidence for MSP, because MSP appears to be predominantly driven by economic and environmental interests rather than by socio-cultural ambitions [8]. This is also partly due to integral problems in describing and weighing cultural values and the difficulty of relating cultural values to specific places to enrich the place-based approach, which is inherent to MSP.

In 2019, McKinley et al. brought together the multidimensional social and cultural facets of MSP [9]. The authors examined how the terms "social" and "cultural" are used (or not) in the context of MSP both theoretically and through examples of how cultural ecosystem services (hereinafter CES), marine citizenship, and well-being are considered in MSP. They also examined the challenges of developing a socio-cultural evidence base, particularly considering the political ecology of coastal space and development. Finally, they also provided evidence as to why a greater inclusion of socio-cultural elements could be significant to MSP.

Specifically, as far as CES are concerned, the Millennium Ecosystem Assessment (hereinafter the MEA) [10] defines them as the "non-material benefits people obtain from ecosystems through spiritual enrichment, cognitive development, reflection, recreation, and aesthetic experiences". Although there is excellent and voluminous input from multidisciplinary, methodological, and theoretical perspectives, the need for a broad understanding of all aspects of CES is acknowledged. The general theoretical argument is that understanding of CES reflects and produces broader "cultural values" linked to ecosystems. Despite some constraints in assessing CES and their value, it is argued [11] that CES cannot be left out of decision-making processes because these intangible benefits are very frequently more important to people than material profits [12].

Furthermore, according to the recent MSP Global International Guide on Marine/Maritime Spatial Planning [13], maritime/underwater cultural heritage (MUCH) is an area of interest to MSP. As already described above, MUCH includes both tangible and intangible traces of human beings. Intangible cultural aspects are relevant to social and cultural identity and are essential for stakeholders' engagement. Therefore, identifying compatibility and incompatibility with MUCH uses is a critical priority during planning. MSP could ensure better conservation of tangible heritage through buffer zones or specific measures while creating synergies through tourism activities [14].

In 2017, Blake et al. [15] considered challenging the production of spatial data for cultural values, given that these values are abstract and difficult to obtain and quantify. They presented a practical manual technique for mapping cultural coastal values using in-person interviews and public participation GIS (hereinafter PPGIS). The method identified hotspots of coastal cultural values across the Falkland Islands and independently of the distance to a settlement in four categories: Natural Beauty, Recreation, Sense of Place, and Cultural History. The maps of coastal cultural values have been incorporated and included under the framework of MSP and in the web GIS for the Falkland Islands, thus promoting the integration of socio-cultural factors in decision-making processes.

Concerning CES, an attempt is being made by [16] to provide a conceptual analysis of this kind of intangible ES and their links to the concepts of landscape, heritage, and identity. The authors discuss how these CES can be assessed and integrated into spatial and physical planning. The assessment process is tested in two case studies, including among them the Arafura–Timor Seas in Southeast Asia, at the seascape scale. According to [17], making reference to cultural services provided explicitly by marine ecosystems and biodiversity, the studies dealing with the importance of cultural services in terms of economic revenue concern mainly "iconic marine habitats" (e.g., coral reefs) and species (e.g., whales). The authors use the examples of scuba-diving in areas of coral reefs and of whale-watching that are both highly attractive for tourists, thus engendering significant income streams at local, regional, and national levels.

Furthermore, Kelly et al. [18] present the Shetland Islands' Marine Spatial Plan (SMSP)—one of the most advanced in the UK, first developed in 2006—in considering the incorporation of the human dimension into MSP. This is understood as an inherent aspect connecting and associating offshore activities to land-based communities, livelihoods, and cultures. The authors highlight the interests of coastal communities that are considered together with the ecological attributes of the marine environment. In response, the SMSP included stakeholder-consulted data and mapped community activities and assets with a cultural and spiritual value. Thus, cultural features were proven to play an active role in the MSP process equal to that of the marine environmental and economic assets. Special policies were drafted in the SMSP for the protection of coastal communities from hostile social impacts and so as to protect the landscape and preserve marine recreation against inappropriate developments.

Relevant to this review article is also an interesting study on the integration of Coastal Cultural Heritage in Integrated Coastal Zone Management (hereinafter ICZM) [19]. The authors propose models and guidelines for defining and evaluating coastal cultural heritage to be included in Marine Spatial Planning (MSP) and ICZM. Coastal cultural heritage is seen as a resource for the application of the integrative complexity theory and learning from experiences of managing other coastal resources. It provides guidelines for the delineation of coastal cultural areas by testing the method and tool used in the case study of Ostend in Belgium. Furthermore, a pioneering article [20] notes the underestimation of immaterial cultural values associated with the sea when practicing MSP. This socio-cultural evidence gap is attributed to inherent difficulties in defining and eliciting "cultural values" but also in associating these values to specific places to enable a place-based approach to marine management. Three key aspects are addressed that have paramount meaning for the inclusion of marine cultural values in MSP: a. defining cultural values; b. labelling places of cultural importance; and c. establishing the relative significance of

these places. The authors recognize the limited value of CES for classifying cultural values. Hence, a method is recommended for structuring a community-based narrative on cultural values and to spatialize them for MSP purposes using five criteria, thus leading to the definition of "culturally significant areas". A baseline of "culturally significant areas" is suggested as an aid to planners. Interestingly, they also strongly emphasize the need for participative processes.

Finally, recent work [21] in light of the MSP process developed in Estonia assessed how cultural heritage and, in particular, its intangible form can be integrated into MSP. Stakeholder engagement was used to carry out mapping of cultural values and to co-create knowledge that resulted in "county portraits," an original approach to foster the potential of MCH and relevant human activities and to endorse its future consideration in the MSP process. The findings validated that the EU MSP Directive (MSPD) offers significant prospects for coastal/marine member states to tailor their MSP and follow adapted solutions for the incorporation of the MCH. The authors believe the integration of MCH into MSPlans could increase the attractiveness of MSP and its capacity to explicitly include various socio-cultural values and different communities.

The present review starts by briefly contextualizing the two main terms of this work, "maritime spatial planning" and "heritage", and the associated "cultural ecosystem services" and "cultural values". Next follows the presentation of the research methodology. The analysis is structured around: (a) a brief quantitative presentation of the results and (b) a broad qualitative analysis of the results based on the bibliometric analysis using the VOSviewer software and then a content-based analysis. Finally, the results are discussed, followed by the conclusions.

2. Materials and Methods

2.1. A Systematic Literature Review Linking MUCH and MSP

As a first step, a literature review was carried out using a comprehensive database of documents to identify the main studies that combined the terms "maritime, and underwater cultural heritage" and "MSP", including documents of all types published in the period from 1996 to 2023. The search resulted in 430 items. Scopus was chosen as the unique database because it has indexed most of the articles published on MSP and cultural ecosystem services (CES). The aim was to collect the body of research investigating the relationship between maritime spatial planning (MSP) and maritime/underwater cultural heritage (MUCH). In the second phase, the results were limited to 346 articles using as criteria whether the article is written in the English language, university access, and the type of publication (journal articles).

To answer the key research question of this paper, the authors conducted a systematic literature review (SLR) to ensure high-quality results, focus on objectives, and allow the research to be replicated. The SLR maps and appraises the articles by identifying research gaps and limits of the subject area. It differs from a traditional narrative review by embracing a systematic procedure that can be scientifically reproduced in a transparent manner, thereby decreasing bias through in-depth bibliographic searches and providing concrete steps for the selection process.

It is noteworthy to mention that there is a great variety of grey literature, including EU or international policy reports or national projects, that was not considered during the bibliometric analysis. Nevertheless, these were more or less analyzed in other parts of this article. Unfortunately, a systematic literature review does not provide the possibility to screen reports, plans, conference proceedings, books, or book chapters that are not peer-reviewed. This is acknowledged as a limitation of the current research, although the results proved to be quite representative both thematically and geographically. During our screening, we discovered a great number of studies dealing with "cultural values", "cultural ecosystem services", "maritime/underwater cultural heritage", and their incorporation in MSP. Once the results were classified, we concluded that concerning our scientific

hypothesis, even though there is a great number of projects funded by the European Commission, the scientific literature is still quite limited.

Table 1 presents the search terms selected for the present research. As defined in the first row, we focus both on "planning"- and "policy"-related terms.

Table 1. Search terms.

Find articles with these terms	"Maritime spatial planning" OR "coastal planning" OR "marine planning" OR "marine policy" OR "coastal policy"
Search title, abstract, and keywords for…	"Underwater cultural heritage" OR "maritime cultural heritage" OR "cultural ecosystem services" OR "intangible heritage" OR "marine cultural heritage" OR "cultural values" OR "socio-cultural values" OR "tangible heritage"

Due to the 2014 EU Directive for MSP (MSPD) [22], the term "maritime spatial planning" is horizontally used in the European literature. Still, in non-EU countries and Sea Basins, the terms "maritime/marine/coastal policy" or "coastal/marine management" are most probably used. This was evident because during the first research attempt, without using the terms "policy" and "management", we did not obtain results from Australia, Asia, or the United States. The following Figure 1 presents the flowchart of the SLR process.

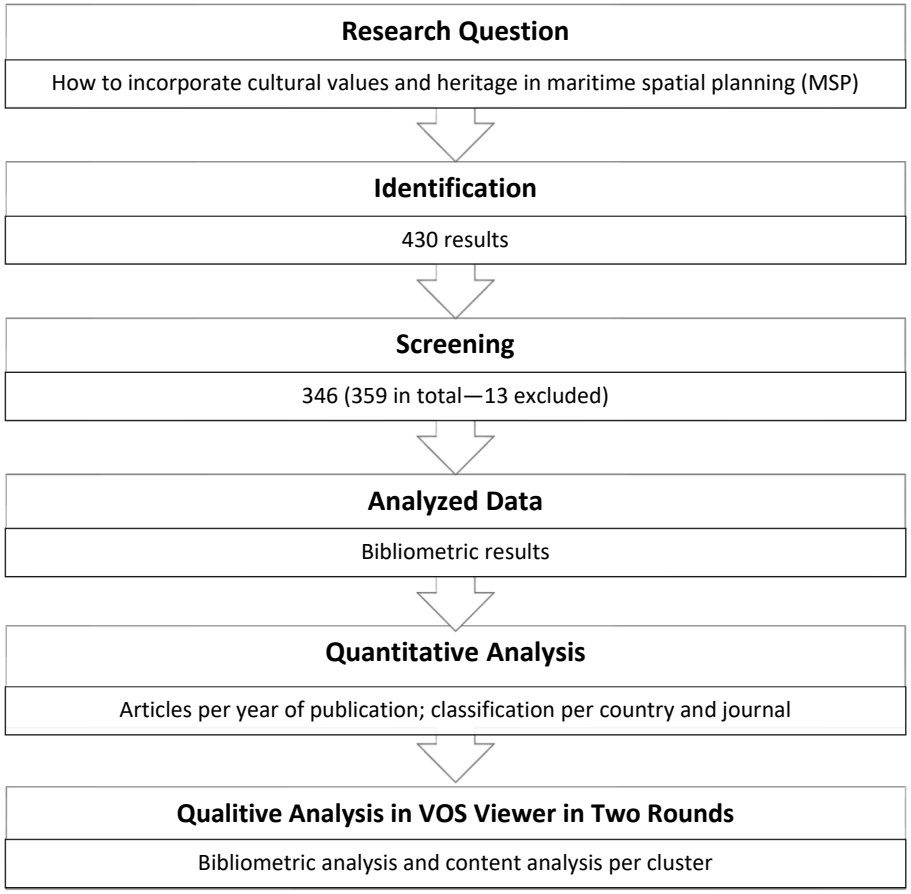

Figure 1. Flowchart of the current systematic literature review (SLR) process.

2.2. Science Mapping and Visualization Analysis—Bibliometric VOSviewer Analysis

Science mapping and visualization analyses are being widely used nowadays to analyze the research trends and evolutionary patterns of different research themes in several fields, including spatial planning. The present literature review based on the Scopus database proceeded to a bibliometric analysis (a tool of science mapping), thus setting out

to investigate the thematic structure, possible interlinkages between the different themes and sub-themes, their evolution over time, the countries that have mostly influenced their development, and the scientific journals with the most contributions in terms of published articles on the relationship between MUCH and MSP. The introductory section presents the results of a quantitative analysis of the selected scientific articles based on the VOSviewer software. Specifically, it sets out to present a broad overview of the published research on the relationship between MUCH and MSP, thus aiming to identify the countries and continents that have contributed the most, the evolution of the research over time, and the key contributing journals.

VOSviewer visualizes the relatedness between different text-based item publications to comprehend the connections between the collected results better. For a more efficient analysis, the software achieves this by grouping the various terms into clusters. These groups are assembled using the content-based qualification method, and they are selected in line with the keywords and the main topics of the publications. Thus, clusters are formed by inventorying and bundling each publication's keywords, abstracts, and main topics. As a result, should two items be more similar to each other according to an automatic analysis of their texts, they have more powerful relatedness. Thus, the outstanding visual importance of each item delivers a graphical illustration of the significance of each group as the linkages between them.

For our analysis, we decided to implement a 2-step round on VOSviewer:

First Round

- Search on Scopus within the article, title, and keywords for the term "marine/maritime spatial planning".
- Collect the resulting articles.
- Run the VOSviewer software by inserting the previous articles.
- Conduct a "zoom in" on the underwater cultural heritage connections.

Second Round

- Search on Scopus for "Maritime spatial planning" OR "coastal planning" OR "marine planning" OR "marine policy" OR "coastal policy" and search the title, abstract, and keywords for "underwater cultural heritage" OR "maritime cultural heritage" OR "cultural ecosystem services" OR "intangible heritage" OR "marine cultural heritage" OR "cultural values" OR "socio-cultural values" OR "tangible heritage"(see also Table 1 above).
- Collect the resulting articles.
- Exclude some of the identified articles according to several criteria (see Section 2).
- Run the VOSviewer software by inserting the previous articles.
- Analyze the VOSviewer science mapping per the created thematic cluster.

We should mention here a few challenges and limits of this methodology. A first challenge is that VOS software is only able to analyze text that is written in a language embedded in the software from its initial development. In this case, the software processes only English text. Therefore, our investigation included only articles written in English from all over the world. Another challenge is that the VOS software is only able to analyze text that is published in journals. There is a lot of research that is published in edited books, and this research was not included in this specific investigation. Despite these challenges, VOS software is a valuable tool for analyzing large amounts of text data. It can be used to identify patterns and trends in the literature and new areas of research. Hereinafter are some specific examples of other investigations that have used VOS software to analyze the humanities, heritage, and planning studies literature. Tavares et al. [23] is conducting a comprehensive literature review to respond to the connection between intangible cultural heritage (ICH) and urban resilience, using the VOSviewer software for content analysis. Alviz-Meza et al. [24] discuss how cultural heritage involves examining the identity formation of communities over time by studying past material and spiritual remains. By applying a bibliometric analysis, the study examines, quantifies, and maps

the scientific production of the fourth industrial revolution applied to heritage studies of science databases from 2016 to 2021. Liu and Pan [25] used VOSviewer to visualize their cooperation networks. By applying VOSviewer visualization, they discussed how cultural heritage involves examining the identity formation of communities over time by studying past material and spiritual remains. The article highlights the responsibilities of both public and private institutions in taking care of the restoration, maintenance, conservation, and promotion of cultural heritage. Finally, Chalastani et al. [26] used VOSviewer software to perform a bibliometric analysis associated with the co-occurrence of keywords and co-authorship trends among all researchers in a study dealing with Marine Spatial Planning (MSP). All of these studies demonstrate the utility of VOS software for analyzing the humanities and heritage studies literature. However, it is important to be aware of the challenges and limits of this methodology.

To note that all abbreviations included in this review paper are displayed in Table A1 of the Appendix A.

3. Results

3.1. Quantitative Analysis through VOSviewer

After careful screening, three hundred and forty-six (346) articles interrelating MUCH and MSP were collected for analysis.

Figure 2 reveals the results of the VOSviewer software analysis. The most influencing countries are the United Kingdom (with 85 published articles cited 2.532 times in total and 76 linkages), the United States (with 78 articles cited 1.673 times in total and 54 linkages), Australia (with 48 articles cited 1.192 times in total and 31 linkages), Canada (with 29 articles cited 1.049 times in total and 24 linkages), and China (with 30 articles cited 102 times in total and 14 linkages). Next follow European countries like Spain, France, the Netherlands, and Germany (Table A2 in Appendix A and Figure 2 below). The analysis per continent is presented in Figure 3 below.

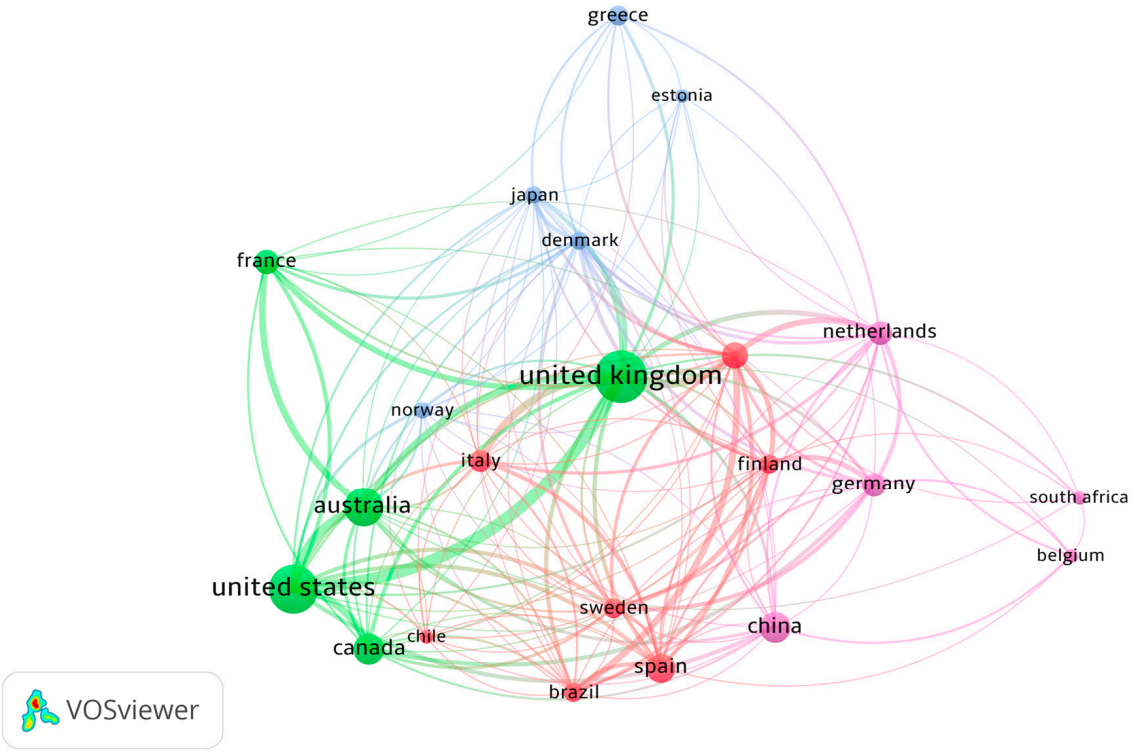

Figure 2. The most influencing countries in the world in relation to the published research on the relationship between MUCH and MSP during the period from 1990 to 2023. Source: Our own elaboration using the VOSviewer software analysis, 2023.

Figure 3. Published papers (%) on the topic of the current review, per continent, during the period from 1990 to 2023 (comparative results). Source: Our own elaboration.

As for the year of publication of the articles collected, the analysis shows that the topic is of great interest, with a continuous upward trend over the last five years (2018–2022). Specifically, while for the period from 1990 to 2013 a single-digit number of scientific articles per year is observed, and the next period from 2014 to 2018 counts around 10–19 articles, in the more recent period of 2018–2022, the number of published articles in scientific journals hosted in the Scopus database increased substantially from 28 (in 2018) to 67 (in 2022). It is worth noting that for the year 2023, articles were collected up to May 2023. Figure 4 below illustrates the detailed results.

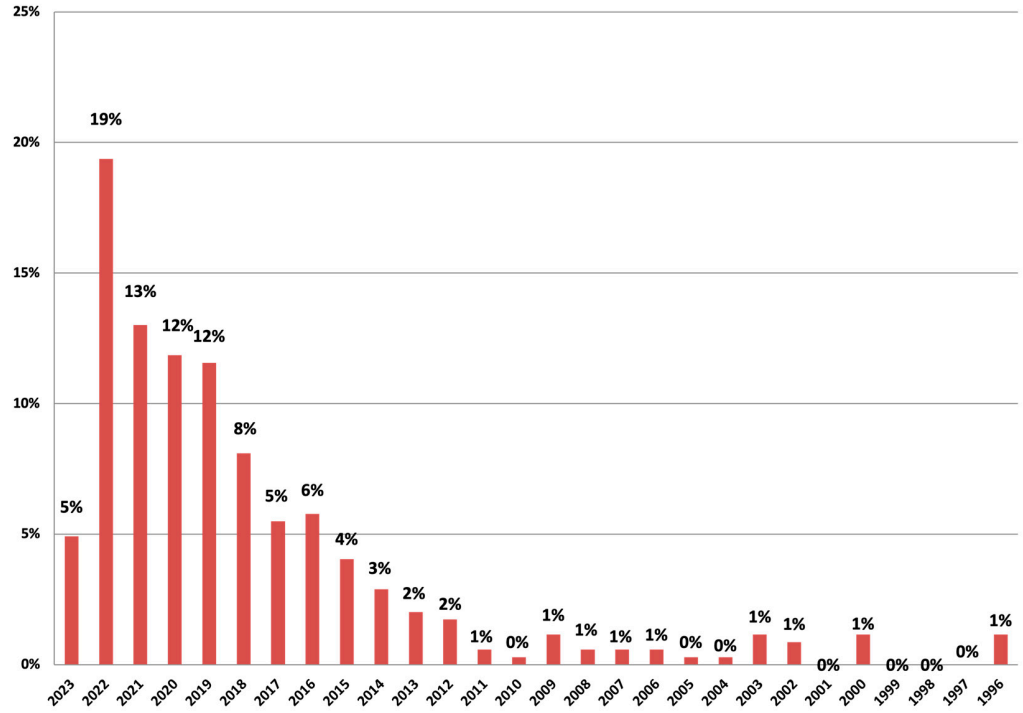

Figure 4. Articles with research topic interrelationship between MUCH and MSP per year of publication during the period from 1996 to 2023.

Regarding the journals with the greatest contribution to the topic, the VOSviewer analysis showed that the top 10 most contributing journals are *Marine Policy* (46 articles), *Ecosystem Services* (27 articles), *Ocean and Coastal Management* (22 articles), *Frontiers in Marine Science* (11 articles), *Journal of Environmental Science* (10 articles), *Land* (9 articles), *Ecological Indicators* (8 articles), *Environmental Science and Policy* (7 articles), *Journal of Maritime Archaeology* (7 articles), and, finally, *Maritime Studies* (7 articles). These results are included in Figure 5 and in Table A3 in Appendix A. It is noteworthy that there is a balance between the volume of articles published in Journals that are primarily dealing with marine sciences and maritime policies (24.9%) and the Environmental science and ecosystems oriented ones (25,4%) whilst only 2% are published in a journal focusing on Maritime Archaeology which is a relatively new discipline.

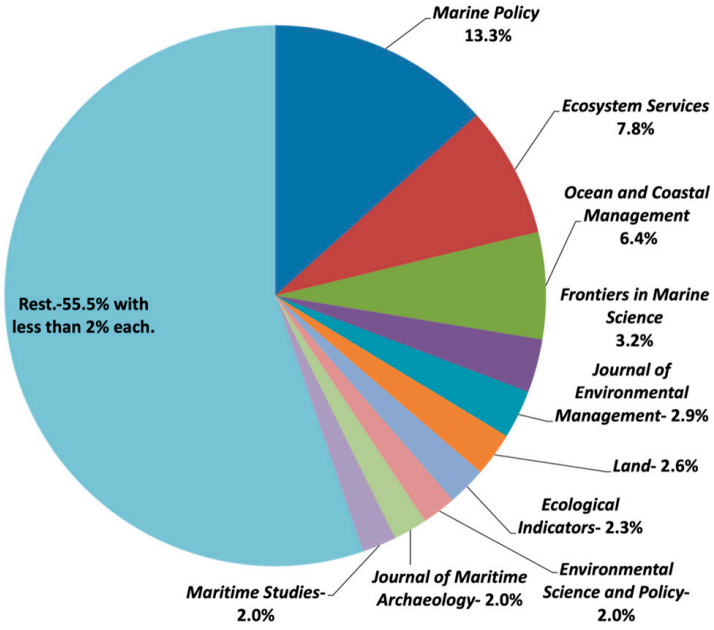

Figure 5. The top 10 most contributing journals for published research on the correlation between MUCH and MSP during the period from 1996 to 2023 (% of total articles).

3.2. Qualitative Analysis

Based on the depictions of the VOSviewer results (see Figure 6), it was practical to make a "zoom in" on underwater cultural heritage (UCH) inter-linkages that coincide with maritime spatial planning (MSP) connections. MSP is a holistic approach for managing human activities at sea, and UCH is an essential maritime resource that needs to be considered in the MSP process. Cultural heritage is a major contributor to the Blue Economy, especially through recreation and tourism. Moreover, MSP can create more opportunities for the preservation of maritime and underwater cultural heritage (MUCH) and for its sustainable use, provided it can successfully balance sectoral competition and respective maritime uses. In the context of a sustainable Blue Economy, the view of the marine environment is gradually shifting towards "space for investment opportunities" in a variety of sectors. This shift can generate economic returns and development but also threats to UCH. Increasing productivity at sea should enhance and not damage irreplaceable cultural heritage.

What follows is the analysis of the inter-linkages between MUCH and MSP (Figure 6).

In addition, based on Figure 7, one can easily distinguish the following key pillars that justify the interrelationship between MUCH and MSP:

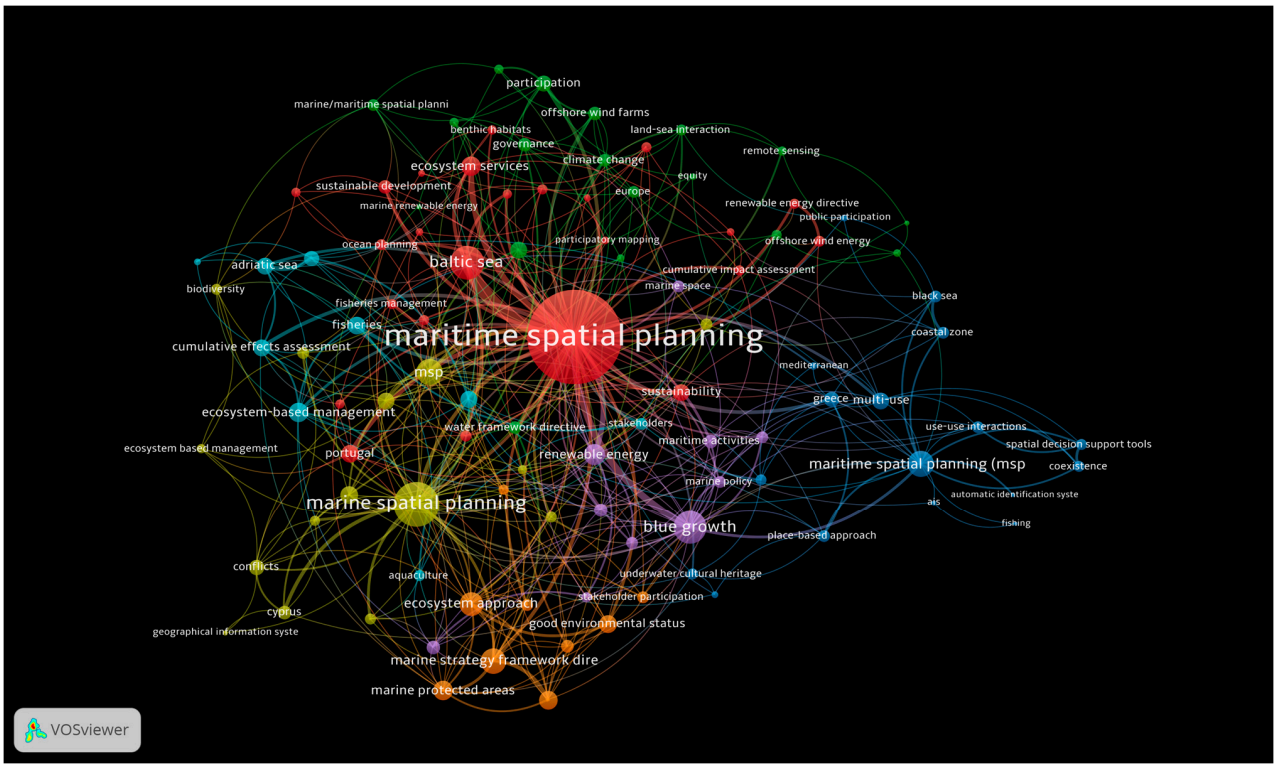

Figure 6. VOSviewer Network Visualization Map.

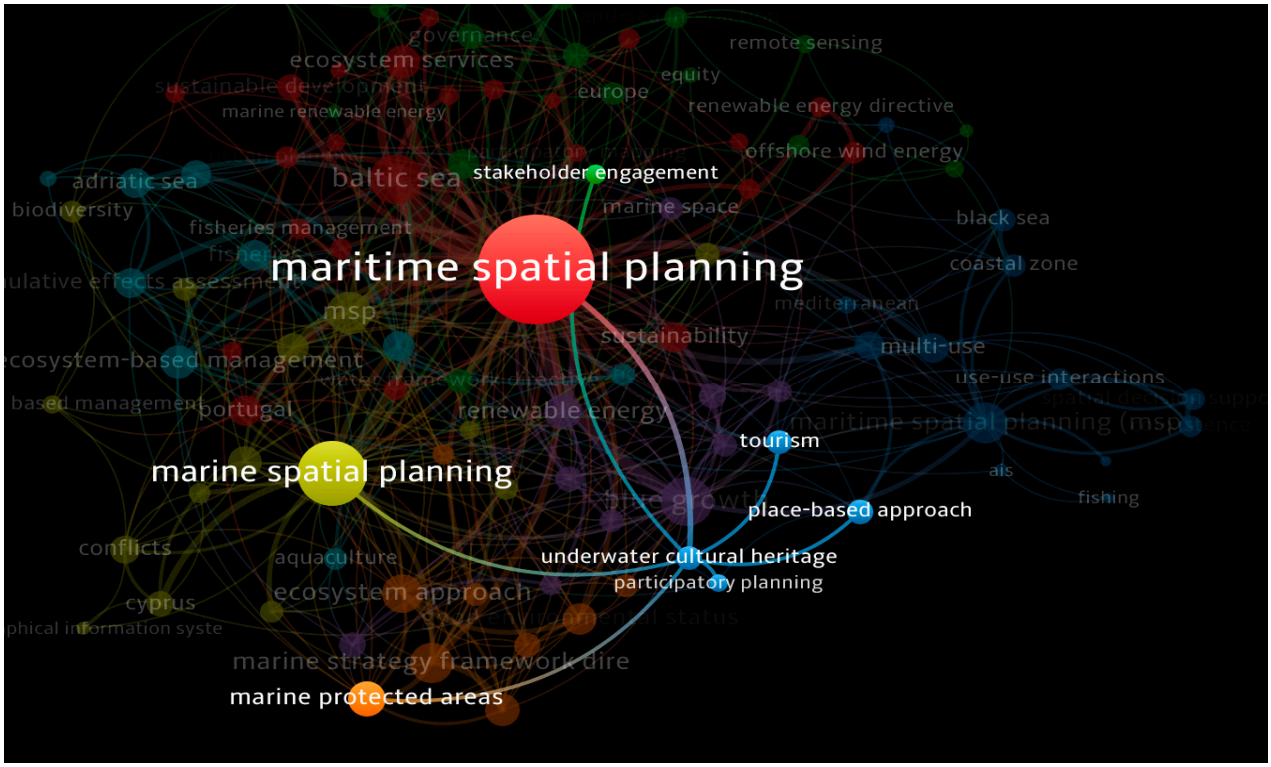

Figure 7. VOSviewer Network Map with "zoom in" on UCH connection.

- The *place-based approach* is a key principle in MSP [27]. It means that MSPlans are tailored to each marine area's particular characteristics. This is mostly important for UCH because it allows for developing tailor-made management measures that protect

UCH sites and objects while supporting sustainable economic and social development. For example, an MSPlan in a marine area with a high concentration of historical shipwrecks might incorporate measures (spatial and non-spatial) to restrict fishing activities or regulate diving tourism in these areas.

- *Tourism* is another meaningful connection between UCH and MSP. UCH can be an asset for coastal communities by providing tourism and economic development opportunities. However, it is of paramount importance to judiciously manage tourism (including diving tourism) to avoid damaging UCH sites and objects. In the literature and in practice, there are often mentions of the co-existence of UCH, diving tourism, and nature conservation in a multi-use setting [14]. MUCH in general provides plenty of opportunities for the development of sustainable tourism [14,21].
- *Protected areas* are another vital aspect in UCH management. Protected areas can contribute to both the protection and conservation of natural and cultural heritage [28] (UCH sites and objects) against damage and disturbance from other activities. MSP is decisive in identifying and designating appropriate marine protected areas (MPAs) and zones for UCH and in developing management measures for those areas. For example, an MSPlan might define a marine area with historic shipwrecks as a protected area, with restrictive measures concerning fishing, anchoring, or diving tourism.
- *Stakeholder engagement* is essential for the accomplishment of MSP. Stakeholders are individuals or groups interested in or affected by UCH or MSP. MSP should engage stakeholders at an early stage and during the planning itself to ensure that their specific interests and values are fully respected. During the MSP process, stakeholders can be engaged in UCH conservation in several ways, including communities of practice [29], representative stakeholders' forums, advisory groups, public hearings, or interviews. Successful engagement of stakeholders is a critical factor that shows that the values and interests of all interested parties are considered in the development of MSplans for UCH.
- *Participatory mapping* is a process in which community members provide their own knowledge and experience about a place to build a map [15,30]. It is a tool used to engage stakeholders in the MSP process. Participatory mapping can identify and map UCH sites and objects but also collect information about the beliefs, interests, and values of the different stakeholders. MSplans may use this input to develop protection measures for UCH while supporting stakeholders' desires and visions.

During the second round of analysis (please see Section 2—Materials and Methods), the literature keywords were collected from Scopus and then inserted into the VOSviewer software.

Figure 8 below provides the resulting visualization scheme, from which six visual-colored groups were distinguished (Red, Green, Blue, Yellow, Purple, and Light Blue Clusters) based on related content via articles' keywords. Looking at the terms corresponding to each group (Table A4 in Appendix A), we can see that the key theme is "heritage", which is the most general concept of our research, thus playing a significant role in the overall discussion.

Cluster Analysis

According to the six colored groups of keywords, six thematic categories were created to analyze the articles per cluster based on each group's set of keywords. The thematic categories of the clusters must be related to the keywords used for the referenced terms. The clusters and their corresponding keywords are displayed in Table A4 in Appendix A, and the number of articles per cluster is associated with the density of keywords that the VOSviewer Map highlighted on the second round.

1. Red Cluster—"Cultural Ecosystem Services, Participatory Mapping and Recreation", being a group of 87 articles.
2. Green Cluster—"Ecosystem services, marine biodiversity and MUCH", being a group of 49 articles.

3. Blue Cluster—"Fisheries, food security, conflicts over fisheries and MUCH", a thematic cluster created by 61 articles.
4. Yellow Cluster—"MUCH legislative and institutional framework and sustainable development", being a group of 55 articles.
5. Purple Cluster—"Coastal Communities, climate change and sustainable development", a thematic cluster created by 53 articles.
6. Light Blue Cluster—"Cultural values, indigenous traditional knowledge, PPGIS", a thematic cluster created by 35 articles.

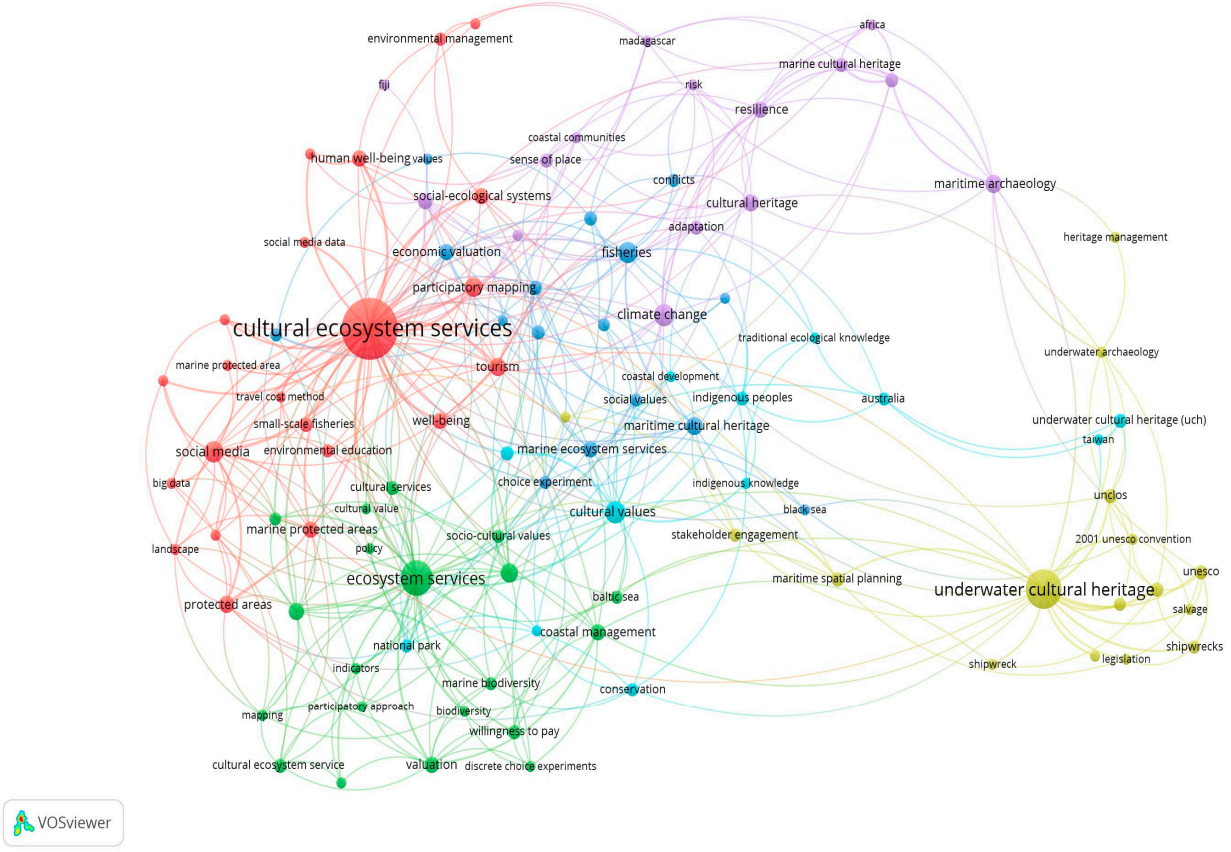

Figure 8. The second-round VOSviewer map of this review.

What follows is an extensive analysis per cluster based on the selected reviewed articles.

1. Red Cluster—"Cultural Ecosystem Services, Participatory Mapping and Recreation"

This cluster explores the multifaceted dimensions of CES, highlighting their benefits, challenges, and pivotal role in fostering sustainable coastal and marine management. As already noted, CES are the non-material benefits people receive from ecosystems. These services foster a sense of cultural identity by connecting people to their coastal/marine heritage. Cultural sites, historic landmarks, but also traditional knowledge allow both local people and visitors/tourists to engage with the unique history and cultural inheritance of coastal communities. Cultural ecosystem services (CES), specifically recreation and tourism, play an increasingly vital role in MSP. Coastal and marine environments offer a series of recreational opportunities and cultural experiences, thus attracting diverse stakeholders, including tourists and local communities.

According to the literature, intangible cultural values have a significant role to play in conservation and planning-related decision making [30], and non-monetary values are usually associated with wildlife, places for recreation, and heritage sites. Recreation is a vital CES related to the sense of place, and it can foster culture, identity, and well-being. Coastal

and marine recreation activities, such as swimming, boating, and wildlife watching, can enhance the cultural identity of coastal communities [30–32]. All of these activities also have an environmental education value. There are mentions in the literature that communities greatly value several locations due to the provision of a series of CES, including scenic qualities and outdoor recreational opportunities, nature/biodiversity-related and intrinsic values, or therapeutic health benefits and social relation prospects [33].

The role of recreation in MSP extends to fostering sustainable tourism. The tourism industry, which is closely interwoven with recreation, depends on coastal and marine environments. Participatory mapping can help identify ecotourism opportunities, minimize conflicts with other uses, and preserve natural and cultural assets. Strategies for balancing recreational activities with conservation goals are discussed as far as they foster visitor experiences and minimize negative impacts on vulnerable coastal environments [34].

Hence, MSP increasingly acknowledges CES, emphasizing their role in enhancing human well-being and community resilience [35]. Integrating CES into planning processes enhances human well-being and community resilience and promotes sustainable management of the sea and the coasts.

Furthermore, the literature makes frequent mentions to participatory mapping as community-based mapping using Geographic Information Systems (GIS) [36]. The participatory approach is a dynamic method to engage stakeholders in managing MSP and MUCH. Mixed-method applications of participatory mapping are used in MSP and MUCH contexts by examining its methodologies, benefits, challenges, and contributions to sustainable marine governance and cultural preservation. More specifically, the participatory mapping of CES, including recreational opportunities, offers a valuable tool for stakeholders, policymakers, and researchers to collaboratively design MSP that balances economic activities with cultural values and environmental conservation. This was the case of the ecosystem services mapping for the Maritime Spatial Plan for the internal waters, the territorial sea, and the Exclusive Economic Zone (EEZ) of the Republic of Latvia [37].

As already mentioned in the Introduction, Blake et al. [15] used a mixed-method design to produce spatial data about cultural coastal values and their spatial dynamics in MSP. Interestingly, areas of high cultural coastal value in relation to the Falkland Islands were defined across four relevant categories as eligible hotspots for integration into the decision-making process. In this way, areas of high cultural value are better protected, and a holistic approach is achieved through the MSP framework.

This cluster of articles highlights the fact that CES, particularly recreation and tourism, are integral to MSP. Their incorporation into MSP fosters economic and natural capital as well as cultural preservation. However, cautious management is required to alleviate challenges, such as over-tourism and the development of grey infrastructure. The successful integration of CES into MSP represents an opportunity to create a more sustainable and inclusive approach to coastal and marine management, thus ensuring the well-being of ecosystems and communities for present and future generations. A voluminous part of the selected articles deals with CES, thus stimulating interdisciplinary approaches for their mapping and assessment [38,39].

2. Green Cluster—"Ecosystem services, marine biodiversity and MUCH"

The Green Cluster supports the idea that the interrelation between maritime/underwater cultural heritage (MUCH), ecosystem services, and marine biodiversity is a dynamic and complex process, with implications for environmental sustainability, economic and social well-being, and cultural preservation. The analysis of this interrelation explores how these elements intersect in maritime regions, thus highlighting their significance and potential challenges. All of the articles included in the Green Cluster demonstrate the multifaceted nature of marine biodiversity, emphasizing the need for conservation and responsible management of marine ecosystems to ensure their long-term sustainability.

Marine biodiversity is the rich variety of life in oceans and seas, encompassing everything from microscopic plankton to massive whales. Biodiversity is crucial for ecosystem resilience, stability, and productivity and supports the delivery of various ecosystem ser-

vices. For instance, healthy marine ecosystems with diverse species populations contribute to fisheries, coastal protection, and carbon sequestration [40]. Additionally, UCH sites, like shipwrecks, can serve as artificial reefs, thus enhancing marine biodiversity [40,41] by offering habitats for various species. Marine biodiversity and the ecosystem services this biodiversity provides are certainly threatened by various activities, such as overfishing, pollution, and climate change [42–46]. However, MPAs that are well-established and efficiently managed can help safeguard these marine assets. Moreover, preservation of MUCH, often co-existing with natural heritage, brings historical value and can contribute to tourism revenue and the local economy in general [28].

On the other hand, the literature puts emphasis on the resolution of conflicts, i.e., over fisheries to safeguard food security and cultural heritage. Mediation and cooperation between competing groups can ensure equitable access to resources while preserving traditional practices. Engaging local communities in fisheries management and heritage preservation is crucial. Their intimate knowledge of the sea and its traditions can inform sustainable practices and safeguard cultural heritage.

In this cluster, it is noteworthy to mention the recent work of Azevedo et al. [47] dealing with the impact of the 2019 Brazilian oil spill disaster on coastal CES that severely affected marine biodiversity. They underline the importance of safeguarding coastal ecosystems. In 2022, Schuyler et al. [48], studied plastic pollution from Australian cities, highlighting its environmental impact on marine biodiversity.

On the other hand, the literature [41] assesses the incorporation of local nature-based cultural values into biodiversity conservation strategies. A few articles highlight the cultural importance of biodiversity for local communities [49], studying the socio-cultural value of fish and fisheries, with several focuses (e.g., the Baltic salmon). In general, emphasis is put on the socio-cultural dimensions of marine biodiversity conservation. Finally, marine zoning is presented as a tool to manage marine areas to preserve biodiversity and ecosystem services. An example is the case of British Columbia, Canada [50]. Summing up, marine biodiversity supports coastal communities by providing a series of ecosystem services and socio-cultural values.

3. Blue cluster—"Fisheries, food security, conflicts over fisheries and MUCH"

The intricate interplay between fisheries, food security, conflicts over fisheries, and MUCH creates a rich global web of challenges and opportunities in coastal regions. This cluster explores the multidimensional dynamics of these elements, recognizing their significant impact on coastal communities and their maritime history.

First come the linkages between fisheries and cultural identity and local traditions. For many communities, fishing is more than a source of livelihood; it is also a way of life that inspires a series of cultural expressions (including dance, music, songs, etc.) closely linked with the marine ecosystems. Fishing traditions are often passed down from generation to generation and contribute to community identity and social cohesion.

Interestingly, fisheries play an important role in providing CES [51]. For example, recreational fishing is a popular leisure activity for people, providing an important income stream for coastal communities. Fisheries can also be important for global food security as they are essential for ensuring that people have access to nutritive food as well as a significant source of protein [52]. Sustainable fisheries management is essential to maintain fish stocks, thus ensuring a consistent food supply and livelihoods for these communities [53].

In coastal communities, traditional fishing methods, traditional boat-building techniques, and cultural practices interwoven with the sea constitute a deep-rooted maritime cultural heritage that provides a sense of identity and continuity for these communities and is a source of ocean literacy. Conflicts over fisheries can disrupt and even threaten this precious maritime cultural heritage. Displaced or distressed communities may leave their traditional practices in the face of resource scarcity or conflict-driven displacement. What follows is the extinction of cultural knowledge and experience passed down through generations [54].

Moreover, climate change is a serious threat to MUCH sites. On the coasts, erosion and inundation may damage or immerse historical structures, shipwrecks, and cultural artifacts, thereby effacing valuable connections to the past. The impacts of climate change, i.e., high temperatures and acidity of the marine environment, can greatly increase the vulnerability of certain types of UCH (e.g., WWI and WWII vessels). This is the case for the Mediterranean, perceived as a highly exposed area to climate change impacts [14,55]. In the Baltic Sea, along with the biological degradation of wooden wrecks that occurs naturally, a specific example of a climate-change-related hazard can be observed [14]. Marine borers, such as the ship-worm, incite an acceleration of the deprivation process. As mentioned by UNESCO, good preservation of the wrecks due to the low salinity and temperature of the water and the lack of marine borers may be reversed due to the increase in water temperature that brings the species (marine borers) to the region.

An idea for climate-smart MSP is the combination of maritime spatial planning (MSP) and Climate Adaptation Planning (CAP) knowledge frameworks into a single planning approach. The efficacy of this theory is empirically deployed in the Gulf of Trieste case study, located in the northern Adriatic basin [56].

Cultural values are essential in fisheries and MSP. MSPlans should consider cultural values when deciding how to manage marine resources. Butler et al. [57], focusing on the Torres Strait, Australia, study the integration of traditional ecological knowledge (TEK) within fisheries management. By acknowledging the cultural significance of species, such as turtles and dugongs, and integrating TEK into management strategies, the research highlights the importance of involving local communities and their values in managing marine resources. This kind of knowledge should, in most cases, be incorporated into the MSP process [58]. Also, Said and Trouillet [59] consider the "deep knowledge" of fishers themselves on various issues, such as the social and cultural aspects of their activities, more credible than the quantitative and bioeconomic data on fisheries. They claim that MSP usually relies on formal data sources, leading to mapping results and planning alternatives that do not essentially demonstrate the real interests of the fishers themselves. The authors opt for a more participatory approach to mapping and planning incorporating kinds of knowledge and information that are usually ignored, which also suggests a less formal production of knowledge.

In 2019, ref. [60] focused on the role of community values and traditional knowledge in managing coastal ecosystem services in the Satoumi seascape of Himeshima Island, Japan. Other researchers [61] explore the perspectives of inshore fishers in the UK regarding the obstacles they face in diversifying into aquaculture. Fishers' viewpoints are providing insights about challenges and opportunities related to fisheries' diversification, highlighting the need for policies and support systems that align with the interests and needs of coastal communities. Cumberbatch and Hind [62] investigate Barbadian bio-cultural heritage by focusing on flying fish. They explore the cultural, ecological, and economic significance of flying fish in Barbadian communities [63]. In 2020, Depellegrin et al. [64], using as a case study the small Lithuanian sea space, provide insights into the sustainable management of small marine areas by quantifying ecosystem services and identifying threats. Durán et al. [65] are investigating the conservation of maritime cultural heritage in a European Atlantic Region. Using a discrete choice experiment, they explore the preferences and values of the public concerning maritime heritage conservation, thus offering insights into cultural and heritage preservation efforts. In 2018, Eckert et al. [66] focused on the yellow eye rockfish and extended historical baselines using indigenous knowledge. By integrating traditional knowledge with scientific data, their research provides a more comprehensive understanding of historical ecosystem conditions, thus aiding conservation and fisheries management. Ernoul et al. [67] explore the role of social values in landscape planning for a flagship species. Using several case studies, their research highlights the importance of considering cultural and ethical values when designing conservation strategies for flagship species, ultimately leading to improved conservation outcomes. Galappaththi et al. [52] focus on the intersectional character of social well-being and gender relations in dried

fish value chains. By examining gender dynamics and social well-being in the context of dried fish production, the research emphasizes the need for gender-inclusive policies and sustainable practices in fisheries.

Moreover, Gómez et al. [54] focus on conflicts between recreational fisheries and other maritime uses in Mediterranean MPAs. By considering cultural heritage and environmental ethical values, the research highlights the challenges of balancing different marine activities in protected areas and the importance of integrated governance models. In turn, Kyvelou and Ierapetritis [68] reverse the conflictual reasoning (and paradigm) and suggest a harmonious co-existence of fisheries with other marine uses (such as tourism and nature conservation) in a soft, multi-use (MU) setting. They also assess the potential of the multi-use "fisheries–tourism–nature conservation" that is fishing tourism within or close to MPAs [69]. Resolving conflicts over fisheries and promoting synergies is essential to safeguarding food security and, at the same time, cultural heritage. Another kind of soft multi-use identified in the literature is the "soft" MU that combines tourism, underwater cultural heritage (UCH), and environmental protection [45,70].

To ensure equitable resource access while preserving traditional practices, mediation and cooperation between conflicting groups is needed. In addition, engaging local communities in both fisheries management and heritage preservation is crucial. Their intimate knowledge of the sea and their traditions can inform sustainable practices and safeguard cultural heritage.

Another vital aspect is international cooperation, because many fisheries and cultural heritage sites have a transboundary dimension [71]. Countries should strongly collaborate on fisheries management, heritage protection, and climate adaptation strategies to ensure the well-being of coastal communities and to preserve their heritage.

In conclusion, the complex web of fisheries, food security, conflicts, and maritime cultural heritage underscores coastal communities' complex challenges [72]. Sustainable solutions that consider both the ecological and cultural aspects of these regions are essential for maintaining the well-being of these communities and preserving their unique maritime heritage for future generations.

4. Yellow Cluster—"MUCH legislative and institutional framework and sustainable development"

The preservation and management of maritime/underwater cultural heritage (MUCH) are unique challenges as they involve submerged archaeological sites and artifacts that bear historical, cultural, and scientific significance. The Yellow Cluster analyzes the legislative and institutional frameworks governing the protection of MUCH. It also assesses their contribution to sustainable development goals, emphasizing the need for a balanced approach that safeguards these valuable resources while promoting economic, educational, and cultural benefits.

As an example, the legal framework for the protection of MUCH in the United States is based on the combination of federal laws and regulations, as well as state-level laws where applicable. The "Abandoned Shipwreck Act" (ASA), enacted in 1987, provides ownership of abandoned shipwrecks to the states' governments. ASA protects abandoned shipwrecks from illegal disturbance, looting, and exploitation for commercial purposes. The ASA generally allows public access to abandoned shipwrecks for recreational diving and educational purposes. The act primarily addresses shipwrecks but may indirectly protect other UCH sites associated with them.

In 2022, Andreou et al. [73] explored extensive data integration in maritime archaeology, highlighting examples in the Middle East and North African regions. The article emphasizes the potential of advanced technologies and data analysis in uncovering submerged historical sites and underpins the unique challenges posed by these regions. Furthermore, Argyropoulos & Stratigea [54] delve into the sustainability aspect of managing UCH, particularly in the Mediterranean, whilst Bashirova et al. [74] discuss the importance of engaging communities and stakeholders in preserving this kind of heritage. The article examines the legal status of MCH and its management in the Russian sectors of the Baltic Sea and

the Gulf of Finland, focusing on the legal framework for managing MCH and offering insights into the situation of the above areas. Because MCH is not fully incorporated into the pilot MSP in Russia, within the framework of a European project, all existent MCH data in the Baltic Sea region were identified and compiled in a database as a first step towards integrating MCH into the MSP process, even if the latter does not yet have a legal status in Russia.

These articles provide a comprehensive overview of the challenges and prospects associated with UCH. They touch upon various aspects, from data utilization and sustainability to legal frameworks and regional considerations. The studies collectively emphasize the importance of preserving and managing this cultural heritage for future generations while addressing the complexities and hurdles involved in these efforts. Moreover, the papers underscore the significance of international cooperation and adherence to conventions [75], like the 2001 UNESCO "Convention on the Protection of the Underwater Cultural Heritage" [76], highlighting the importance of engaging local communities and integrating UCH into MSP following an interdisciplinary and holistic approach, which is necessary for safeguarding these valuable resources.

Our study of articles identified in this cluster revealed a strong interest in the Chinese perspective. The relevant articles contribute to understanding UCH in China from different angles, including regulation, impact assessments, legislation, state-led approaches, and geopolitical considerations in the South China Sea. In 2016, Lu and Zhou [77] examined China's state-led approach to protecting UCH. They covered the practical aspects of this model, the challenges faced, and potential solutions for addressing these challenges Recently, Li and Chang [78] discussed China's recent efforts in regulating and protecting UCH in line with the 2001 "Convention on the Protection of Underwater Cultural Heritage". The authors examine the specific regulations, policies, and initiatives that China has implemented to safeguard its underwater cultural heritage. In 2019, Lin [79] focused on the challenges and issues related to conducting impact assessments for UCH in China. The author delves into the practical difficulties and concerns associated with preserving and assessing the impact on UCH sites. In 2022, another analysis of the Chinese legislation regarding protection of UCH within the context of MSP was conducted by the same author [80]. This second paper explores the legal framework, implementation challenges, and the intersection of cultural heritage protection with marine planning in China.

In 2020, Zhong [81] discussed the significance of UCH in the disputed South China Sea context. The author explores how this heritage is affected by territorial disputes and the broader geopolitical implications. In summary, these articles collectively provide a broad perspective on the challenges and conservation of UCH, emphasizing the need for continued research, international collaboration, and sustainable practices in managing this unique aspect of our historical heritage. Understanding these challenges is essential for responsibly preserving and exploring our submerged cultural past.

Furthermore, effective governance is essential for balancing the protection of these invaluable historical resources with the promotion of the UN Sustainable Development Goals (SDGs), including cultural preservation, economic benefits, education, and environmental conservation. As global awareness of the significance of MUCH continues to grow, it is crucial to enhance international cooperation, strengthen national legal frameworks, and foster collaborative partnerships to ensure the sustainable management of this unique cultural heritage for present and future generations. This is at the heart of sustainable development.

5. Purple Cluster—"Coastal Communities, cultural values and heritage, climate change, and sustainable development"

The above key topics met in the fifth cluster, which, considered together with MSP or marine management, constitute a complex, interconnected web of challenges and opportunities.

Recent research (2023) carried out by [82] considers marine cultural heritage and its connections as a complex, multifaceted, intersecting, and multidimensional system, comparable to marine social-ecological systems. In this view, the authors pinpoint current

social-ecological crises such as climate change and their impacts like ocean pollution, wealth disparities etc. These impacts can have significant consequences for coastal communities, including economic losses, displacement, and destruction of cultural heritage. The authors consider cultural dimensions as a vibrant component of these systems, able to provide key insights into how people interact with nature and become cautious for their environment. Therefore, they opt for better understanding of MCH (both tangible and intangible) by developing context-specific processes to recognize, safeguard and promote these cultural links to the sea and the coasts. Coastal communities are sensitive to climate change impacts, such as rising sea levels, coastal erosion, intensified storms, and other changes in marine ecosystems. All of these phenomena pose imminent risks to these populations. As Lau et al. [83] argue to make coastal communities adapt to climate change and build the necessary resilience, sustainable development is essential. Sustainable development can increase the resilience of coastal communities to climate change impacts, and it can also assist the development of more resilient economies and livelihoods.

In turn, Ounanian et al. [84,85] argue that MSP can be a powerful tool for supporting sustainable development in coastal communities. This kind of holistic and place-based planning can ensure that coastal resources are used in a sustainable way, and it can also mitigate conflicts between different users of the sea. Clarke et al. (2021) [86] confirm that cultural values are an essential consideration in MSP, as they can significantly impact the well-being of coastal communities. Cultural values include traditional knowledge and practices, spiritual beliefs, and recreational and aesthetic values.

In 2022, Holly et al. [87] argued that MSP can protect traditional fishing grounds, promote sustainable tourism, and protect sacred sites in East Africa. They consider measures that support sustainable development in coastal communities and empower them to protect their cultural values. Furthermore, Malinauskaite et al. [88] examine the socio-cultural values of multiple ecosystem services (ES) obtained from whales in Skjálfandi Bay, North Iceland. The study addresses the research gap in non-monetary valuation of marine ecosystem services. Using a multi-method approach, it draws on stakeholders' perceptions of the influence of whale ES on human well-being through stakeholder mapping, semi-structured interviews, observations, and socio-cultural preference surveys. In 2021, Escamilla-Pérez et al. [89] argue that MSP can be used to build resilience in coastal communities. Their study found that MSP can assist communities for adapting to climate change impacts and increasing their resilience. These studies suggest that MSP is a promising tool for supporting sustainable development and protecting cultural values in coastal communities. However, it is essential to note that MSP should be conducted in a participatory manner, with the full involvement of coastal communities.

Overall, these articles suggest that either marine management or MSP are promising tools for supporting sustainable development and protecting cultural values in coastal communities. However, it is essential to note that MSP should be conducted in a participatory manner, through the broad involvement of coastal communities. An interesting approach is the one of Strand at al. [82] claiming that it is rather needed to qualify instead of quantify cultural dimensions of ecosystem-based ocean management, and foster contextual participatory research methodologies to better understand marine cultural heritage and cultural connections to marine social-ecological systems. This is consistent with the place-based approach in MSP.

Summing up, there is plenty of evidence that coastal communities worldwide face an increasing threat from climate change. In many cases, these communities are also economically reliant on sectors like fisheries and tourism, making them more vulnerable to environmental changes. Community engagement and local knowledge are essential aspects of this equation. Coastal citizens often have valuable traditional knowledge about their environment, and involving them in marine management decision-making processes and in MSP, enhances the success and sustainability of these initiatives.

6. Light Blue—"Cultural values, indigenous traditional knowledge, indigenous people, traditional ecological knowledge, PPGIS"

Coastal indigenous communities possess deep-rooted cultural values intricately tied to the sea, which substantially influence their relationship with marine ecosystems and resources. Integrating cultural values and indigenous traditional knowledge, often through participatory methods—e.g., using Public Participation Geographic Information Systems (PPGIS)—is an innovative approach to marine and coastal management, and lately, to a lesser extent, to the MSP processes.

Coastal and marine management has increasingly focused on CES (instead of the full scope of cultural values), as these are more commonly found in coastal zones [90], even though they remain poorly known and, ultimately, of limited use in planning processes [11]. The main reason for this is the difficulty of assessing and integrating them into scientific assessments [91]. Nevertheless, researchers have occasionally tried to highlight them, map them, and assess their economic impact [92].

The particular interest of MSP in CES is still under research. The question is if the latter may enrich this holistic and strategic process with a cultural dimension that will boost its acceptance by the local and regional levels. This cultural dimension is certainly the synthesis of indigenous traditional knowledge, traditional ecological knowledge and information, local values, and practices to better use available resources. This may also enhance the involvement of indigenous and local communities in the MSP process.

Contemporary research shows that coastal and marine management often applies interdisciplinary approaches and practices to the use of available resources, thus extracting knowledge and information from oral traditions and local cultural values of indigenous peoples [93–98]. These practices are linked to certain mechanisms, such as flexible user rights and land tenure, adaptations for the generation, accumulation, and transmission of ecological knowledge, institutional dynamics, mechanisms for cultural internalization of traditional practices and associated worldviews and cultural values that contribute to both increased community solidarity, community engagement, and voluntary compliance, thus providing proper "rules" for marine and coastal ecosystem management [99,100]. According to [101], indigenous women are substantially contributing to preserving cultural values, and a cross-generational transfer of traditional knowledge and practices is linked with the exploitation of natural resources.

Furthermore, it has been validated that an appropriate and profound understanding of CES and their on-site mapping fosters local community trust and involves local people more effectively and representatively in spatial planning processes [98,102,103]. This is because their protection and development become the highest priority of indigenous communities [104]. The participation of local people is essential in planning and decision-making processes on issues related to the use and protection of the marine environment [94,96,99,105]. The exclusion of the local population from these processes jeopardizes the local community's trust, which is a prerequisite for efficient implementation [103]. The value and the necessity of a more systematic involvement of the local community in ecosystem management of marine and coastal areas through public participatory processes and practices integrating cultural values and CES as critical parameters are highlighted by a series of recent articles [92,98,106–108].

Specifically, the integration of cartographic visualization of local cultural values to engage indigenous people in more effective coastal and marine planning is introduced in some cases [102,109]. Furthermore, to highlight ecosystem management priorities for Brazil's subtropical marine and coastal ecosystems [109] participatory workshops were organized exploring the views of five local groups of marine user groups (marine transport, tourism and recreation, shipping, mining, and fishing). In addition, culture's symbolic and strategic value to represent and engage local and minority populations in MSP processes was demonstrated, when reaching out through participatory processes to the Australian Aboriginal community of Brewarrina [91].

Finally, Diggon et al. [107] present the Marine Plan Partnership (MaPP), an extremely interesting example of collaborative marine planning between local and national governments aimed at protecting ecological and cultural values while supporting sustainable economic activities in British Columbia, Canada. This is, in fact, a meaningful model of how cultural heritage and values may be incorporated in MSP.

Public participation GIS (PPGIS) have recently been used to enrich information regarding CES. At the same time, strengthening participatory processes significantly increases the representation of the local population, thus enhancing the prospects of successful planning in coastal and marine areas. Kobryn et al. [11] argue that participatory mapping methods provide a means of identifying and assessing cultural ecosystem values and services. The use of PPGIS to collect spatially explicit information on the relationship between existing CES and the administrative, demographic, and physical features of large and remote coastal areas is necessary, especially when other widespread methods (interviews, workshops, etc.) are not feasible and stakeholder interests are dispersed [11]. A typical example is also the work of [109], who used PPGIS applications and concluded that mapped ecosystem values were significantly more abundant in the studied coastal zones, regardless of ecosystem value type, locality, population, or principal land use. They also noted that particularly Cultural ecosystem values were more frequently mapped in the coastal zones.

Incorporating indigenous traditional knowledge into MSP through PPGIS acknowledges the wisdom held by these communities and facilitates the creation of spatially informed plans that echo their cultural beliefs. By engaging indigenous stakeholders in participatory mapping exercises and decision-making processes, MSP can embrace a holistic approach that harmonizes ecological conservation, traditional practices, and local values, thus leading to more sustainable and culturally sensitive coastal and marine planning and management strategies.

4. Discussion

The bibliometric analysis carried out above revealed, first of all, the importance of legal frameworks in guiding the incorporation of cultural heritage into MSP (see Yellow Cluster). International conventions, such as the 2001 UNESCO Convention on the Protection of the Underwater Cultural Heritage, provide a basis for safeguarding heritage sites. However, gaps and inconsistencies in national legislation and implementation strategies were also addressed. Another challenge that was revealed by the bibliometric analysis is the integration of cultural ecosystem services (CES) into MSP (see Red Cluster). First, MSP increasingly acknowledges CES. Secondly, the successful integration of CES into MSP should be addressed as an opportunity to create a more sustainable and inclusive approach to coastal and marine management. To this end, technical issues of mapping, assessment and valuation of CES should become property of planners, when dealing with the integration of CES into the MSP process.

Whilst this review provided insights into the state of play of incorporating MUCH into MSP, several research gaps and future directions became apparent. These encompass the need for standardization during the impact assessment, the investigation of innovative technologies for on-site documentation, and the assessment of the socioeconomic benefits stemming from heritage preservation within diverse MSP contexts [13,14].

Furthermore, this article highlighted that the relationship between ecosystem services, marine biodiversity, and MUCH is a dynamic and complex process, with implications for environmental sustainability, economic and social well-being, and cultural preservation. Another essential element is the engagement of local communities in fisheries management and heritage preservation. The fishers' intimate knowledge of the sea and the traditions of the fishing communities can inform sustainable practices and safeguard cultural heritage. Several specific examples of the role that cultural values play when interwoven with MSP, and how MSP considers these values, are summarized in Tables 2–5, below.

Table 2. Specific examples of how cultural values play an essential role in fisheries, food security, and MSP.

Case Study	Significance of Cultural Values	Inclusion in MSP
Philippines, coral reefs	Coral reefs are vital for fisheries and cultural tourism. They are home to marine species, thus contributing to food security and local livelihoods. They are also linked to cultural tourism, being popular tourist destinations.	MSP in the Philippines is considering the importance of coral reefs for fisheries and cultural tourism.
United States, traditional fishing grounds	Native American communities have been fishing in the same coastal/marine areas for centuries. These places are important to their culture and way of life.	MSP in the United States is considering the importance of traditional fishing grounds for Native American communities.
European Union, MPAs	MSP is being used to promote sustainable fishing practices that will help ensure future food security.	MSP designates areas where fishing is restricted or prohibited (usually MPAs). This helps to protect fish stocks and ensure that they can recover in the medium or long term.

Table 3. Examples of how MSP can be used to support sustainable development in coastal communities, considering cultural values.

Action	Method	Result
Protecting traditional fishing grounds	MSP can designate areas as traditional fishing grounds, where only traditional fishing methods are allowed.	This can help to protect the livelihoods of coastal communities and their cultural heritage.
Promoting sustainable tourism	MSP can designate areas for sustainable tourism development.	This can help create economic opportunities for coastal communities while protecting the environment and cultural values.
Protecting sacred sites	MSP can be used to protect sacred sites important to coastal communities.	This can help to ensure that these sites are preserved for future generations.

Table 4. Indicative regional MSP initiatives supporting sustainable development and protecting cultural values in coastal communities.

Name of Regional Initiative	General Aim	Cultural-Value-Related Measures
Baltic Sea Action Plan (BSAP)	- Promote sustainable development and protect the environment in the Baltic Sea.	- Measures to protect coastal communities from climate change impacts. - Measures to protect cultural values, such as traditional fishing grounds and sacred sites.
Australia, Great Barrier Reef Marine Park Authority	- Develop a marine park management plan that includes a zoning scheme to protect different reef areas for different uses, such as conservation, tourism, or recreation.	- Measures to protect the cultural values of the reef, such as Aboriginal and Torres Strait Islander heritage.
United States, Coastal Community Resilience Initiative.	- Help coastal communities to develop MSPlans to adapt to climate change and build resilience.	- Provision of technical assistance and financial support to communities so as to develop MSPlans that meet their needs.

Table 5. Good MSP-related practices with socio-cultural implications.

Topic	Practice	Result
Traditional fishing grounds	In Fiji, MSP designates traditional fishing grounds for local communities.	This is helping to protect the livelihoods of these communities and their cultural heritage.
Sacred sites	In the Philippines, MSP is being used to protect sacred marine sites, such as coral reefs and mangroves.	This is helping to ensure that these sites are preserved for future generations.
Recreational and aesthetic values	In the United States, MSP is being used to protect areas important for recreation and tourism, such as beaches, surf spots, and scenic areas.	This is helping to support the local economy and protect the cultural values of these areas.
Community engagement	In Canada, MSP engages with coastal communities and learns about their values and priorities. Participatory mapping is used to collect this information.	Community voices are heard in the MSP process.
Mapping cultural ecosystem services	In Indonesia, participatory mapping is used to map the cultural ecosystem services important to coastal communities.	This information is being used to inform MSP decisions and to protect these services.
Mapping recreational opportunities	In the United Kingdom, participatory mapping maps recreational opportunities in coastal areas.	This informs MSP decisions and ensures that recreational needs are considered.
Tourism	In the Mediterranean, MSP is being used to promote sustainable tourism development in coastal areas.	This is helping to create economic opportunities for coastal communities while protecting the environment and cultural values.
Recreational fishing	In Australia, MSP is used to designate recreational fishing areas.	a. Recreational anglers have access to fishing opportunities. b. Fishing pressure is distributed evenly across the marine area.
Other recreational activities	In New Zealand, MSP designates areas for other recreational activities, such as swimming, surfing, and kayaking.	This is helping to reduce conflicts between different users of the marine space and to ensure that everyone can enjoy the coast.

Overall, MSP can be a powerful tool to support sustainable development in coastal communities and protect their cultural values. However, it is important to note that MSP should be conducted in a participatory manner, with the full involvement of these communities. Moreover, public awareness and engagement in preserving MUCH are critical. Some countries may have more advanced public outreach and educational programs than others, thus contributing to disparities in the level of protection and public appreciation of underwater cultural resources.

European seas have a variety of submerged cultural heritage sites, including shipwrecks, submerged settlements, and ancient artifacts. Each country may have unique MCH resources with varying historical and archaeological significance. The management of MCH usually falls under the national authorities, with each state responsible for its

own cultural resources through specific superintendencies. While the EC can provide overarching guidelines and recommendations, the specific implementation and enforcement of legislation related to MCH typically remains the responsibility of the different countries. EU member states have also developed legal frameworks for protecting and managing maritime cultural heritage. In the MSP context, these frameworks must balance the preservation of historical sites with other marine activities, such as shipping, fishing, and offshore wind parks. Conflicting interests and priorities may hinder the development of harmonized EU-wide legislation.

MCH preservation often relies on accurate documentation and data management. While EU-level legislation can promote data sharing and best practices, the recording and preservation of MUCH may vary significantly between member states, leading to inconsistencies in heritage management.

MUCH often transcends national borders, raising questions about international collaboration and the need for cohesive EU-wide strategies. While the EU can facilitate cooperation, coordinating efforts among different countries and stakeholders may require further attention. Meaningful stakeholder engagement is essential for the success of MSP. Legislation encourages involvement, but there may be gaps in specifying the extent and depth of engagement required, which could lead to inconsistent practices across member states.

In conclusion, the gap in EU legislation on MUCH at the country-by-country level reflects the complexities of preserving and managing these valuable historical assets. While the EU can coordinate and advise, protecting and managing maritime heritage ultimately lies with individual member states. Bridging these legislative and governance related gaps requires continued transnational cooperation, resource allocation, and, primarily, the recognition of the importance of preserving Europe's rich maritime cultural heritage for future generations. This is an issue for future research or dedicated projects. Future research should focus more on legal and technical measures for integrating cultural values into MSPlans and coastal policy frameworks.

The idea of the "underwater cultural landscape" is another topic for future research, especially in the spirit of the Council of Europe Landscape Convention (2000). The Convention includes land, inland water, and marine areas and requires the integration of the landscape into planning policies. As Barr [110] evokes, "maritime cultural landscapes" may be an influential tool for place-based management. According to the author, these symbolize collective contributions to sustaining and improving places to which people have given special importance. They can also lead to a better understanding of how people have contributed to what they have become, what they have learnt along the way, and how this knowledge may continue to make these places significant for future generations.

5. Conclusions and Further Research

A key conclusion of the present review is that cultural values should become a central concern in MSP, as they can considerably impact the well-being of coastal/marine communities. Considering aesthetic values, traditional knowledge and practices, spiritual attitudes, and recreational values in MSP and, more generally, in coastal and marine policies is critical to promoting sustainable development.

MUCH, associated with tangible and intangible heritage, cultural ecosystem services, cultural values, and, more broadly, socio-cultural values, should be considered when conservation and planning-related decision making takes place in coastal and marine areas. This review has also highlighted the importance of incorporating CES and socio-cultural values into planning frameworks. By doing so, decision makers can consider the potential benefits that coastal ecosystems provide to local communities and how coastal development may impact these communities. This can lead to more inclusive decision-making processes and better stakeholder engagement, ultimately contributing to achieving sustainable development goals.

The diversity of the literature addressing the relationship between MUCH and coastal/marine management or, to a lesser extent, MSP with a focus on sustainability, revealed the

role of local communities and local stakeholders, the significance of cultural ecosystem services, the necessity of indigenous knowledge transfer, and the need for participatory procedures in labelling culturally significant areas.

A second key conclusion is that for MSPlans to be innovative and acceptable by local communities and separate local stakeholders, the "missing layer" of socio-cultural values and data is indispensable. In the MSP process, MUCH should be understood within this broader framework of socio-cultural considerations.

Finally, this review emphasizes the need for future research to focus on integrating cultural and historical values into MSP and coastal policy frameworks in a harmonized way in Europe and worldwide. This research can help decision makers of different disciplines (planners, archaeologists, etc.) better understand how to balance environmental, economic, and social considerations in coastal development and ultimately contribute to sustainable development goals. Beyond the consideration of environmental, economic, and social factors, MSP should explicitly consider cultural values. These values can be seen either as an important social factor or, preferably, as a separate field, but they should never be neglected in MSP-related decision making.

It is noteworthy that this socio-cultural knowledge should become "property" of the maritime spatial planners, because, traditionally, it is rather produced in the context of coastal and marine resource management. Thus, we are strongly recommending that a debate be opened among planners on these very important issues that are predominantly defining the success of the MSPlans, including their social acceptance. For example, the recently created Community of Practice (CoP) for MSP in the Mediterranean should take the initiative for mutual learning between practitioners of both archaeology and planning. This is mostly meaningful in the Common Sea, which is strongly endowed with cultural values and vast reserves of maritime cultural heritage.

Transforming our economies to properly consider ecological limits, overcome societal biases, and learn from local and indigenous communities about traditional means of sustainable living as well as understanding the prominence of culture, cultural heritage, and cultural ecosystem services will contribute to developing economies and societies that are resilient and that are following the path of sustainable human well-being.

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Appendix A

Table A1. List of abbreviations.

CES	Cultural ecosystem services
CoP	Community of practice
EA	Ecosystem Approach

Table A1. *Cont.*

ES	Ecosystem services
EU	European Union
GIS	Geographic Information Systems
InVEST	Integrated Valuation of Ecosystem Services and Tradeoffs
MCH	Maritime cultural heritage
MEA	Millenium Ecosystem Assessment
MPAs	Marine protected areas
MSP	Marine/maritime spatial planning
MSPD	Maritime Spatial Planning Directive (MSPD)
MSPlans	Marine/Maritime Spatial Plans
MUCH	Maritime/underwater cultural heritage
PPGIS	Public Participation Geographic Information System
TEK	Traditional ecological knowledge
UCH	Underwater cultural heritage
UNESCO	United Nations Educational, Scientific and Cultural Organization

Table A2. The countries that contributed the most to the published research relating to MUCH and MSP during the period from 1990 to 2023.

Country	Articles	Citations	Linkages
United Kingdom	85	2532	76
United States	75	1673	54
Australia	48	1194	31
China	30	102	14
Canada	29	1049	24
Spain	25	354	20
Portugal	20	168	45
France	19	410	30
Netherlands	17	828	40
Germany	16	388	32
Italy	15	827	19
Greece	13	130	14
Brazil	11	201	21
Sweden	11	411	20
Finland	10	142	21
Denmark	9	99	29
Japan	9	96	16
Norway	8	278	6
Belgium	6	75	9
Estonia	6	4	9
South Africa	6	81	7
Chile	5	144	1

Source: Scopus database and own elaboration by authors, 2023.

Table A3. Journals that have published articles on the relationship between MUCH and MSP during the period from 1990 to 2023 (journals with three or more articles).

Journal	Articles
Marine Policy	46
Ecosystem Services	27
Ocean and Coastal Management	22
Frontiers in Marine Science	11
Journal of Environmental Management	10
Land	9
Ecological Indicators	8
Environmental Science and Policy	7
Journal of Maritime Archaeology	7
Maritime Studies	7
Coastal Management	6
Ecological Economics	6
Global Environmental Change	6
Heritage	6
Ocean Development and International Law	6
People and Nature	6
Sustainability (Switzerland)	6
Ambio	4
Estuarine, Coastal and Shelf Science	4
Landscape Ecology	4
Applied Geography	3
Conservation Biology	3
Ecology and Society	3
International Journal of Cultural Property	3
International Journal of Nautical Archaeology	3
Land Use Policy	3
Science of the Total Environment	3

Source: Scopus database and our own elaboration, 2023.

Table A4. The six clusters of the research, according to the science mapping exercise.

1	2	3	4	5	6
Red Cluster	**Green Cluster**	**Blue Cluster**	**Yellow Cluster**	**Purple Cluster**	**Light Blue Cluster**
Cultural Ecosystem Services, Participatory Mapping, and Recreation	**Ecosystem Services and Marine Biodiversity**	**Fisheries, Food Security, and Conflicts**	**MUCH Legislation and Institutional Frameworks**	**Coastal Communities, Climate Change, and Sustainable Development**	**Cultural Values and Indigenous Traditional Knowledge**
big data	Baltic Sea	aquaculture	2001 UNESCO Convention	adaptation	Australia
cultural ecosystem	biodiversity	Black Sea	cultural ecosystem services	Africa	coastal development

Table A4. *Cont.*

1	2	3	4	5	6
Red Cluster	**Green Cluster**	**Blue Cluster**	**Yellow Cluster**	**Purple Cluster**	**Light Blue Cluster**
Cultural Ecosystem Services, Participatory Mapping, and Recreation	**Ecosystem Services and Marine Biodiversity**	**Fisheries, Food Security, and Conflicts**	**MUCH Legislation and Institutional Frameworks**	**Coastal Communities, Climate Change, and Sustainable Development**	**Cultural Values and Indigenous Traditional Knowledge**
cultural ecosystem services	coastal management	choice experiment	heritage management	climate change	conservation
ecosystem service value	cultural ecosystem service	conflicts	law of the sea	coastal communities	cultural values
environmental education	cultural services	economic valuation	legislation	coral reefs	development
environmental management	cultural value	ecosystem-based management	maritime spatial planning	cultural heritage	indigenous knowledge
human well-being	discrete choice experiment	fisheries	salvage	Fiji	indigenous people
landscape	ecosystem services	food security	shipwreck	Madagascar	national park
mangrove	indicators	local knowledge	shipwrecks	marine cultural heritage	PPGIS
marine protected areas	mapping	marine ecosystem services	South China Sea	maritime archaeology	Taiwan
marine protected area	marine biodiversity	marine cultural heritage	stakeholder engagement	resilience	traditional ecological knowledge
nature-based recreation	Marine Spatial Planning	non-monetary valuation	treasure salvage	risk	underwater cultural heritage
participatory mapping	natural resources	relational values	UNCLOS	sense of place	
protected areas	participatory approach	science policy interface	underwater archaeology	sustainability	
small-scale fisheries	policy	social values	underwater cultural heritage	sustainable development	
social media	recreation	values	UNESCO		
social media data	socio-cultural values				
social ecological system	spatial analysis				
supply and demand	valuation				
tourism	willingness to pay				
travel cost method					
user-generated content					
well-being					

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