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Review

Cultural Ecosystem Services Research Progress and Future Prospects: A Review

Liangjian Yang [1,2] and Kaijun Cao [1,2,*]

[1] Key Laboratory of the Sustainable Development of Xinjiang's Historical and Cultural Tourism, Xinjiang University, Urumqi 830046, China
[2] School of Tourism, Xinjiang University, Urumqi 830046, China
* Correspondence: caokaijun@xju.edu.cn

Abstract: Cultural ecosystem services (CESs) are direct influences on human well-being and sustainable development, and they have become increasingly important in the development and progress of society. This paper reviewed 1248 papers on CESs by using VOSviewer and CiteSpace software. On this basis, we also reviewed 179 selected empirical papers related to this field, with regards to geographical locations, study objects, evaluation methods, and categories. The results show that: (1) the number of publications related to cultural services has increased year by year, and *Ecosystem Services, Ecological Indicators,* and *Sustainability* are the top three journals with the greatest amount of research published; (2) ecosystem services, benefits, management, and social–ecological systems are perceptions closely related to CES research, which are also popular topics in the field; (3) the results of a keyword detection show that the cultural landscapes, patterns, mental health services, social value, and other keywords were popular keywords used from 2005 to 2021; (4) CESs have mainly attracted the attention of many developed countries, and the cultural services in cities, oceans, and coastal areas have become the focus for researchers; (5) the recreation and ecotourism, and aesthetic values are the common categories of the CES empirical studies, while the knowledge system and the cultural diversity are the two categories with the least amount of research; (6) the evaluation methods of CESs are mostly carried out using a traditional questionnaire and interview, but mapping and modeling methods have been widely used in recent years.

Keywords: ecosystem services; cultural ecosystem services; bibliometrics; cultural services evaluation; systematic review

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1. Introduction

Many interesting concepts and topics have emerged through the process of interaction between humans and nature. Nature has made significant improvements to the well-being of humans through its diverse material and nonmaterial contributions. Humans can not only obtain food, raw materials, and clean water from the natural ecosystem, but they can also gain some non-material benefits, such as leisure and recreation, spiritual fulfillment, personal development, social relations, and aesthetic experience [1]. These nonmaterial interests are defined as the cultural ecosystem services (CESs) that link humans with nature. These interests are defined by the Millennium Ecosystem Assessment (MEA) as the non-material benefits that people obtain from ecosystems through spiritual fulfillment, cognitive development, thinking, recreation, and aesthetic experience [2]. With the deepening of people's understanding of CESs, we can also consider these services as benefits that are provided by nature in order to improve quality of life [3].

In 1997, Costanza estimated the value of cultural services [4] and clarified that CESs have an important value, which promoted the research on the value and monetization of CESs. At the same time, it also made other authors realize the economic value and importance of CESs [5,6]. Since the MEA was held in 2005, social organizations and the

academic community have never stopped discussing and studying cultural services [7–10]. The MEA proposed four types of ecosystem services, including provisioning services (e.g., food, water), regulating services (e.g., pollination regulation, water regulation), supporting services (e.g., flood control by riparian systems and carbon sequestration and storage by plants), and cultural services [2]. Among them, cultural services were considered to be more closely related to our spiritual values and human well-being [11,12]. Compared with the provisioning and regulating services, a CES is not considered to be a dominant service in the ecosystem, but as the only non-material service, its role in the ecosystem is indispensable. Moreover, CESs are related to the quality of an ecosystem's sustainability. The current level of the development of human society enables human beings to replace the supply and regulation services of a local ecosystem's degradation through socio-economic means. For example, polluted well water can be replaced with bottled water, but CESs cannot be replaced by technological means [13,14]. In addition, numerous studies have shown that cultural services promote physical and mental health in humans and contribute to the improvement of their overall well-being [15,16]. Therefore, this requires research to pay more attention to CESs.

Currently, due to the importance of cultural services for human health and well-being, the increasing number of related studies has led to many new topics and alternative research methods. It not only shows that CES research has a strong potential, and the relevant research results highlight the significance of CESs for human well-being and regional sustainable development [17–19]. In the early studies, the market value of cultural services has attracted much attention. Therefore, the research on estimating the cultural service economy using a monetary valuation method is a popular topic [9,20,21]. However, in recent years, with the in-depth study of CESs, scholars believe that only some cultural services, such as tourism services, have a significant market value [22]. For non-marketable CESs, such as inspiration, religion, and a sense of place, monetary valuation methods are difficult for the evaluation of their marketable value [22]. Therefore, this method is limited to a small number of CESs and has been criticized and questioned by some scholars [23]. Many new research topics and alternative research methods have emerged in the academic community in order to provide scientific and quantitative cultural services in many aspects. Among them, under the context of cultural service management, mapping, and modeling, CESs have also begun to become mainstream in academia [23,24]. Empirical studies using the Social Values for Ecosystem Services (SolVES) model, public participation mapping (PPGIS), geospatial analysis, and other research tools are gradually increasing [25–27]. In terms of geographical location, cultural services have gradually attracted the attention of many developing countries [27,28], which will further enrich the research of global cultural services. In terms of research subjects, cities, parks, forests, protected areas [29–32], and other areas with an important cultural service value have become the key areas of research. In addition, the classification of CESs is also an important part of the research into cultural services. The 10 types of cultural services in the MEA report are currently the common classification forms, including recreation and ecotourism, aesthetic values, educational values, cultural heritage values, spiritual and religious values, sense of place, inspiration, social relations, knowledge systems, and cultural diversity [2]. The Economics of Ecosystems and Biodiversity (TEEB) and the Common International Classification for Ecosystem Services (CICES) have also carried out systematic research on the classification system of CESs, which have been reviewed by many authors [33,34] or applied in empirical research [35]. In general, the current research on cultural services is diversified, and there are also some new research topics and alternative research methods. This deserves further attention from researchers.

In prior CES research review studies, a small sample size was used for literature reviews, which promoted the academic community's attention on CES, such as [10,36,37]. Additionally, some reviews tend to use qualitative descriptive analysis [38], lacking systematic quantitative analysis. In addition, the review content selected by some authors is limited to the discussion of cultural service indicators [14], research methods [39], classifica-

tion [33], and so on, which makes an insufficient contribution to the overall understanding of the research hotspots and characteristics of cultural services. At present, the status of cultural service research in the overall ecosystem service research is increasing. We need to comprehensively evaluate some conclusions of the past research on cultural services through quantitative means in order to provide a reference basis and some clarification for future research. Bibliometric analysis can provide a pathway for the analysis of a large number of documents and identify the hotspots and evolutionary characteristics of previous studies [40,41]. However, bibliometric analysis has some limitations in literature content review. Systematic quantitative review can make up for the lack of understanding of the research content. Therefore, this study combines bibliometric analysis with systematic review methods. The former is used to analyze a large number of CES studies from 2005 to 2021, and the latter is used to review empirical studies. In this review, we try to review the following issues: (1) exploring the current research status and research hotspots of cultural services; (2) analyzing the geographic location, research objects, service categories, and research methods of an empirical study on cultural services; and (3) discussing the loopholes and deficiencies of the current research on cultural services and considering the future research prospects.

2. Materials and Methods

2.1. Papers Selection

The reviewed papers include two parts: the first comprises all CES-related peer-reviewed journal articles from 2005 to 2021, and the second comprises empirical papers that are more closely related to this topic.

In the first part, for bibliometric analysis, papers published between 1 January 2005 and 31 December 2021 with the search terms "cultural ecosystem services" or "cultural services" in the titles, keywords, and abstracts were obtained from the Web of Science Core Collection (WoSCC), which is one of the primary sources for most bibliometric analyses [42]. A total of 1272 publications were obtained. All book chapters and conference abstracts were excluded, resulting in 1248 valid papers (Figure 1).

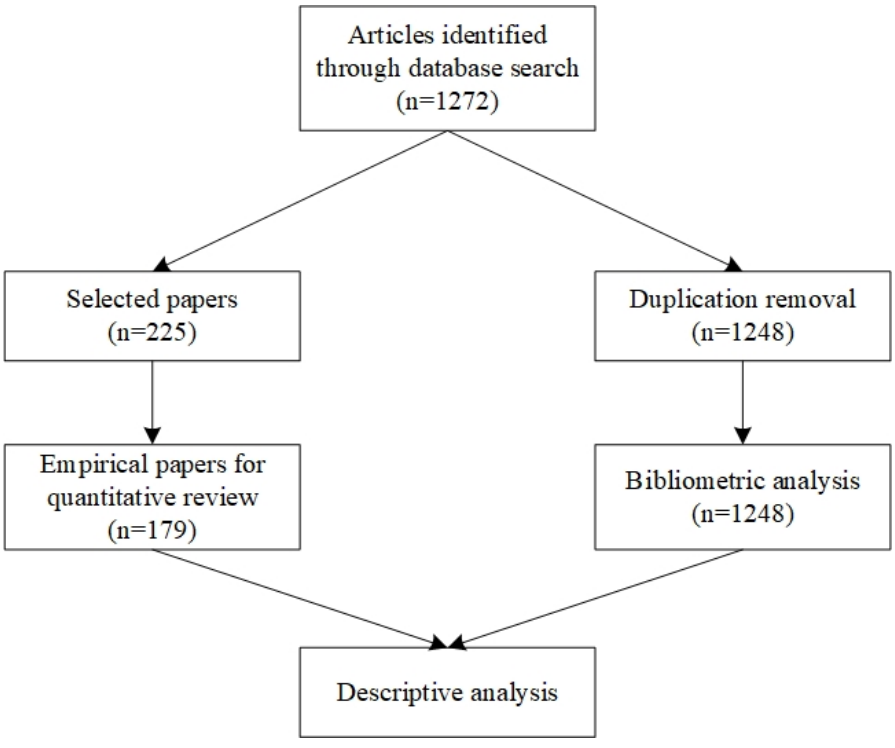

Figure 1. Data processing and research framework.

In the second part, selected empirical papers were used for quantitative analyses to explore the state of CES empirical research and provide supportive evidence for future practice. In the previous review, two methods of quantitative review paper selection were included. One was to review all types of journal papers (e.g., case studies, reviews, and conceptual papers) (e.g., Milcu et al., 2013 [10]) and the other was to take only empirical research as the review object (e.g., Cheng et al., 2021 [43]). This review belongs to the second category. The process of the paper selection was as follows. First, 1248 papers obtained from WoSCC were imported into Endnote software for management. Second, the search function of Endnote was used to closely search related studies for the terms "cultural ecosystem services" in titles and keywords, and 225 closely related cultural services papers were obtained. Finally, non-empirical papers were eliminated by reading them one by one, and 179 empirical papers were selected for systematic review and analysis of CES categories and evaluation methods. Through an extensive literature review, the quantitative statistical results were explained, together with descriptive analysis (Figure 1).

2.2. Bibliometric Analysis Tools

2.2.1. VOSviewer

VOSviewer (https://www.vosviewer.com/, accessed on 24 January 2022) is a software tool used for constructing and visualizing bibliometric networks [44]. The software can construct networks of keywords, authors, organizations, countries, and cited references [45]. Keywords are the concentration and summary of the content and themes of the literature. By analyzing the high-frequency keywords in the whole field, the hotspots and frontiers of the research in this field can be explored. Keywords with emergent characteristics are words with a high-frequency change rate over a certain period of time, which can reflect the research trend [46]. Additionally, keyword co-occurrence analysis can detect keywords that appear in the same publication and identify frequently used keywords [45,47]. In this review, we construct a co-occurrence map in terms of keywords by using VOSviewer 1.6.18, which created by Nees Jan van Eck and Ludo Waltman in Leiden, The Netherlands.

2.2.2. CiteSpace

CiteSpace is a bibliometric analysis software developed by Dr. Chaomei Chen [48]. Co-citation analysis, such as analysis of cited reference, cited author, and cited journal, which is an important tool of CiteSpace, is widely used in quantitative literature review [49,50]. Citation burst analysis of keywords can reflect changes in interest in a professional field, thereby revealing research hotspots in different periods [51]. Therefore, this paper analyzes the research hotspots and frontiers of CES through the keyword citation burst tool of CiteSpace software.

2.3. Classification of the Identified Papers

To ensure the reliability of the review, a question set was formed with reference to Milcu's review [10]. For each reviewed paper, six questions that were formulated on the basis of our research objectives and based on a preliminary literature review and expert judgment were answered (see Table A1, Appendix A for more details). The questions sought to gather basic information about the reviewed literature: (1) whether the article was an empirical study, (2) the geographic location of the studies, (3) the research object of the studies, (4) CES categories addressed by the study, (5) the CES evaluation method, and (6) whether the paper used monetary or non-monetary methods.

2.3.1. Geographic Location of Studies

The geographic locations were recorded during the review of each paper. According to Cheng's guidance [43], we recorded the countries that conducted the study to indicate their geographic location. If a study was carried out in several countries, we would use regional descriptions to record its location, such as "Europe" or "Global."

2.3.2. Research Object of the Studies

Research objects are an important component of empirical research, and researchers choose different research areas and objects on the basis of their research backgrounds and methods [43]. Exploring different research objects is also conducive to our understanding of the sources of CESs and the process of obtaining them, which contributes to new knowledge systems for cultural services. For example, to study the cultural services provided by the marine ecosystem, some scholars chose the marine ecosystem as the research object [52], whereas others chose shellfish as the research object [53]. Although they all come from nature, the CES categories that they provide highly differ. The research subjects of this review were categorized into two groups. The first was a specific study area, which included urban, rural, forest, and park areas. The second category included animals and vegetation, such as plants and trees. Studies that contained multiple research objects were counted. For example, regional parks in urban areas are considered regional and urban parks.

2.3.3. Cultural Ecosystem Service Categories

This review examined CES categories based on the Millennium Ecosystem Assessment classification, including aesthetic values, cultural diversity, cultural heritage values, educational values, inspiration, recreation and ecotourism, sense of place, spiritual and religious values, social relations, and knowledge systems. The CES category of each empirical paper matching the MEA category was counted in this review [39].

2.3.4. Evaluation Methods

Many types of evaluation methods exist in the existing empirical research. However, research methods can generally be divided into two groups: monetary and non-monetary [39,54]. On the basis of this classification, statistics were created, and all the methods used in each paper were classified. If multiple methods were used in the same article, they were recorded twice or more. For example, if the main method of a study is expert-based, but it is carried out in the form of interviews, expert-based and interview methods will be recorded separately.

3. Results

3.1. Overview of General Papers

As Figure 2 shows, the number of papers on CESs increased rapidly from 2005 to 2021. The number of published papers has increased significantly, particularly in recent years. In 2021, 206 CES-related papers were published, which was 25.75 times that of 2005. Among all source journals, *Ecosystem Services*, *Ecological Indicators*, and *Sustainability* ranked the top three in terms of publication volume (Table 1).

Table 1. Top 10 journals for cultural ecosystem service publications.

Source Journals	Publications	Rank
Ecosystem Services	136	1
Ecological Indicators	52	2
Sustainability	47	3
Ecological Economics	34	4
Ecology and Society	30	5
Landscape Ecology	24	6
Landscape and Urban Planning	24	7
Urban Forestry and Urban Greening	22	8
Science of the Total Environment	21	9
Land Use Policy	21	10

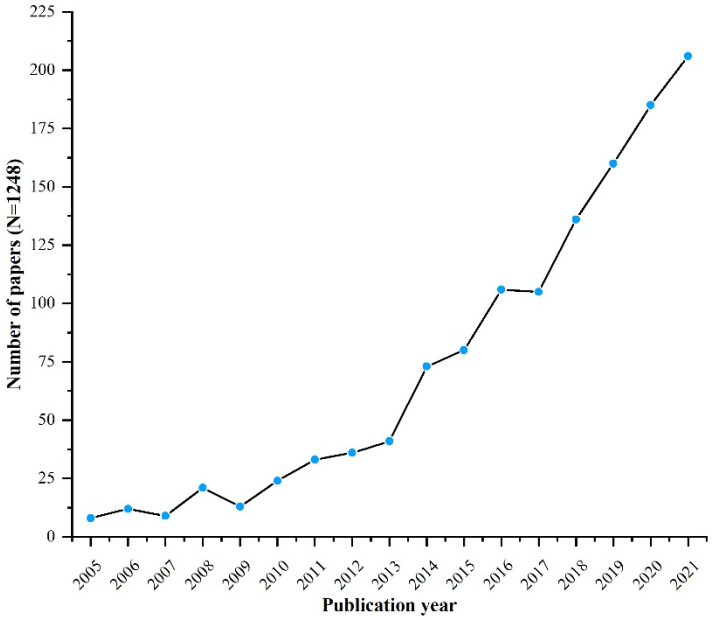

Figure 2. Number of cultural ecosystem service publications from 2005 to 2021.

3.2. Bibliometric Analysis of Keywords

3.2.1. Co-Occurrence Network of Keywords

Figure 3 shows the CES keyword co-occurrence map of 1248 papers. Each circle represents keywords in a given field [55]. The size of the circle reflects the number of papers of the corresponding CES keyword. The distance between two circles indicates the strength of the co-occurrence link between the keywords, and the closer the two circles are located to each other, the stronger the co-occurrence link between the corresponding keywords [56]. Colors represent clusters of keywords with strong co-occurrence links, and lines are used to indicate the link strengths between keywords. As shown in Figure 3, there were seven clusters in total with 14,449 links, and the total link strengths were 27,916. The central keyword of cluster 1 was cultural ecosystem services; the number of occurrences was 371, and the total link strength was 2680 (Table 2). It can be concluded that cluster 1 has strong links with cluster 2, whose central keyword was ecosystem services with an occurrence of 231 times, and the total link strength was 1644. The number of occurrences of other central keywords, such as management (co-occurrence: 217), biodiversity (co-occurrence: 176), perception (co-occurrence: 104), and benefits (co-occurrence: 77) were all above 50, with only social–ecological systems (27) being less than 50, while the total link strengths were all over 200 (Table 2). The full set of co-occurrences of each keyword can be found in the review database.

Table 2. The occurrences and total link strengths of central keywords in each cluster.

Cluster Code	Central Keyword	Number of Occurrences	Total Link Strength
1	Cultural ecosystem services	371	2680
2	Ecosystem services	231	1644
3	Management	217	1660
4	Biodiversity	176	1392
5	Perceptions	104	803
6	Benefits	77	636
7	Social–ecological systems	27	241

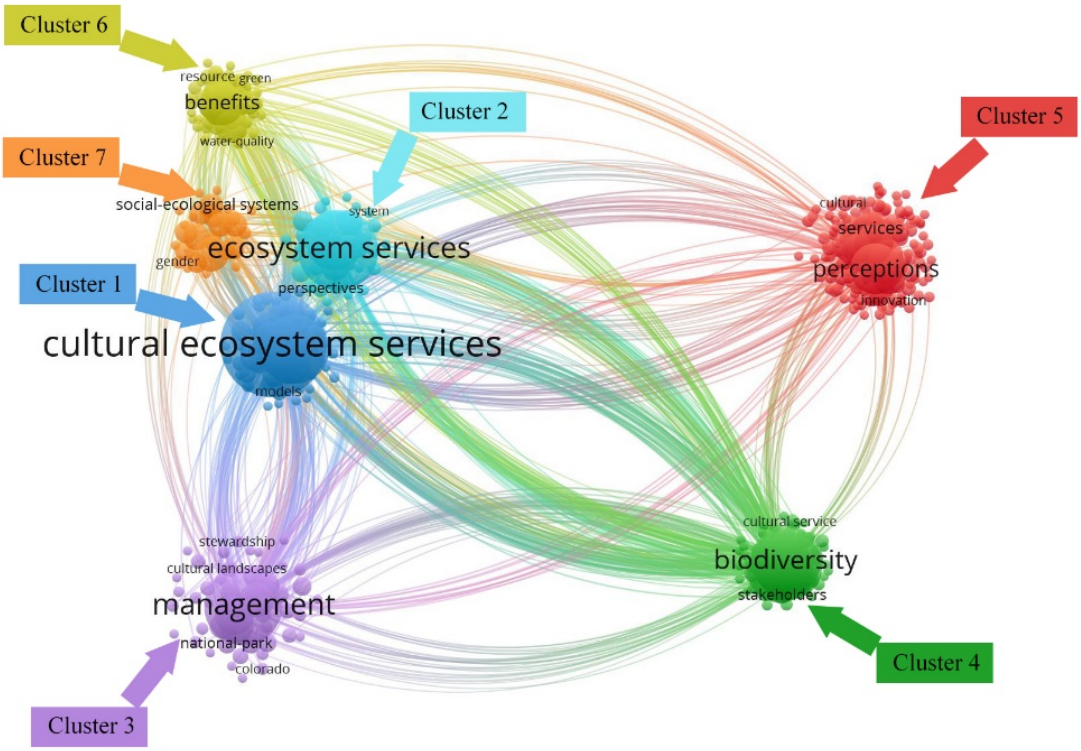

Figure 3. CES keyword co-occurrence network.

3.2.2. Burst Keywords Detection

The burst strength of burst detection indicates the intensity of focus on a given field [57]. The cultural landscape has been the main topic since 2013, with focus subsequently diversifying to include "pattern" (strength: 6.57) and "mental health service" (strength: 5.03); these keywords' strengths were above 5 and reflect the degree of their influence on CES research (Table 3). In terms of the keyword evolution process, "behavior" (2005–2011), "cultural diversity" (2005–2012) and "care" (2006-2014) were the active topics in 2005–2014. Keywords such as "mental health services" (2010-2013), "United States" (2010–2014), "choice" (2010–2014) and "willingness to pay" (2014–2016) indicate that these were the important issues in 2010-2016. Keywords such as "social value" (2016–2017), "demand" (2018–2019), "recreation" (2018–2019) and "Social media" (2019–2021) have become the focus of research in recent years (Table 3).

Table 3. Top 23 keywords with the strongest citation bursts.

Keywords	Strength	Begin	End	2005–2021
Behavior	3.86	2005	2011	
Cultural diversity	2.95	2005	2012	
Care	4.33	2006	2014	
Mental health services	5.03	2010	2013	
Service	3.71	2010	2013	
United States	3.60	2010	2014	
Mental health	3.57	2010	2011	
Choice	3.15	2010	2014	
Provisioning service	3.95	2012	2016	
Regulating service	3.18	2012	2016	
Cultural landscape	6.63	2013	2014	

Table 3. *Cont.*

Keywords	Strength	Begin	End	2005–2021
Need	4.09	2013	2016	
Knowledge	3.66	2013	2015	
Agriculture	3.13	2013	2014	
Willingness to pay	3.69	2014	2016	
Cultural safety	2.99	2014	2016	
Service quality	4.26	2015	2016	
Social value	4.71	2016	2017	
Restoration	3.61	2017	2018	
Demand	4.10	2018	2019	
Recreation	3.40	2018	2019	
Pattern	6.57	2019	2021	
Social media	4.51	2019	2021	

3.3. Systemic Review of CES Empirical Papers

3.3.1. Geographic Location of the Studies

The reviewed studies have a clear geographic focus on Europe and North America. As shown in Figure 4, China ranked first with 18 studies, and the number of publications here accounted for 10.1% of the total. The USA ranked second with 17 studies, accounting for 8.9%, and Germany was third with 8.4%. In addition, the UK, Italy, Europe, Spain, Chile, and Australia had more than six each, and fewer than five studies were conducted in the remaining countries. In some countries, only one study was conducted, which is not shown in Figure 4.

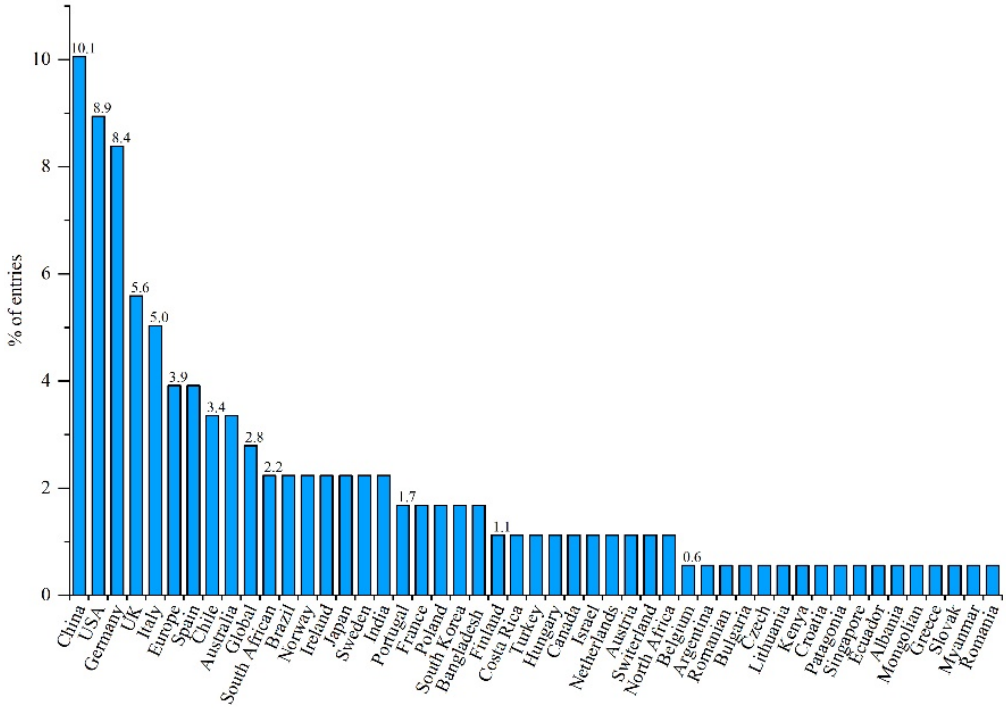

Figure 4. Geographic distribution of the reviewed studies (% of 179 entries).

3.3.2. Research Object of the Studies

Many studies have focused on the CESs of cities, oceans, and forests. As shown in Figure 5, most studies concentrated on urban areas (16.8%); the second most common was a focus on marine and coastal areas (12.8%); the third most common was a focus on forests (11.7%). Of the 179 studies, 21 focused on regional and local areas. In addition, six studies mainly explored specific animals and plants, such as shellfish, sea trout, and trees.

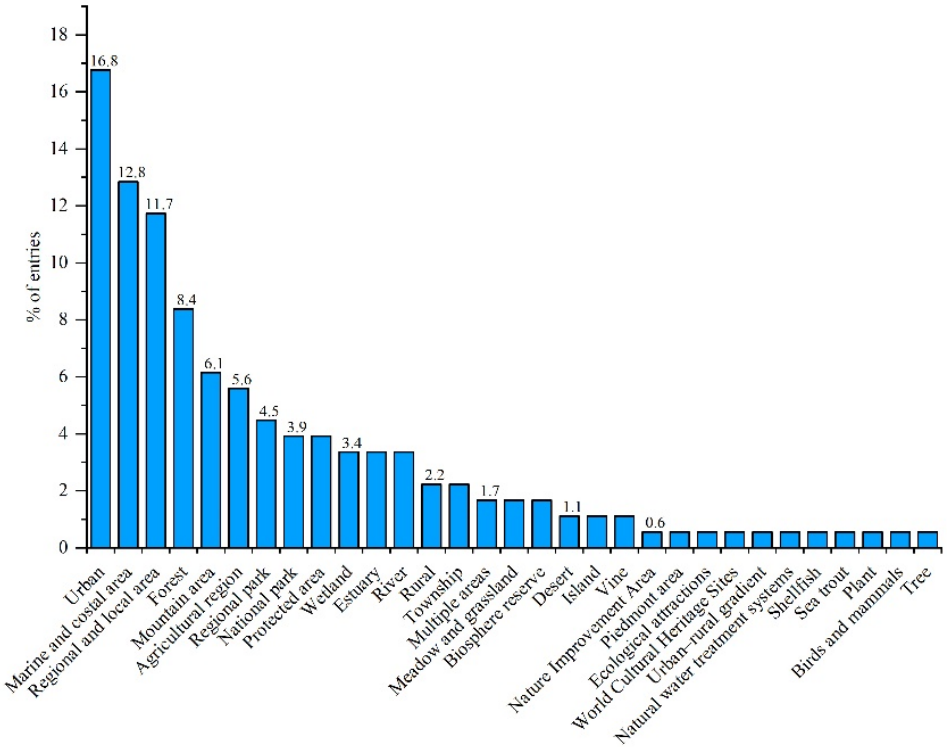

Figure 5. Research object of the reviewed studies (% of 179 entries).

3.3.3. CES Categories

The recreation and ecotourism services are the most used CES categories, with 109 empirical papers assessing the recreation and ecotourism services, which accounted for 60.9% of the reviewed studies, followed by aesthetic values, cultural heritage, and spiritual and religious values (87, 48.6%). Contrastingly, knowledge systems and cultural diversity were the least studied categories in the research field (Table 4).

Table 4. Cultural ecosystem service categories in the reviewed studies.

Categories	Number of Studies	% of Entries
Recreation and ecotourism	109	60.9
Aesthetic values	87	48.6
Cultural heritage values	64	35.8
Spiritual and religious values	60	33.5
Education values	51	28.5
Social relations	39	21.8
Inspiration	36	20.1
General CES	29	16.2
Sense of place	29	16.2
Cultural diversity	9	5.0
Knowledge systems	7	3.9

3.3.4. Evaluation Methods

Twenty-four CES evaluation methods were used. As Figure 6 shows, of all the 179 empirical papers, most studies used questionnaires to evaluate CESs, which ranked first among all methods (34.1%), followed by evaluation models (28.5%), interview methods (18.4%), participatory mapping methods (15.6%), and the social media method (14.0%). The number of studies using quantitative calculation, focus groups, observation, expert-based methods, and contingent valuation accounted for 2.8% to 6.7%. The use of other methods ranged from 0.6% to 2.2% in all studies. Moreover, the majority (92%) used non-monetary methods (see Supplementary Materials for more details).

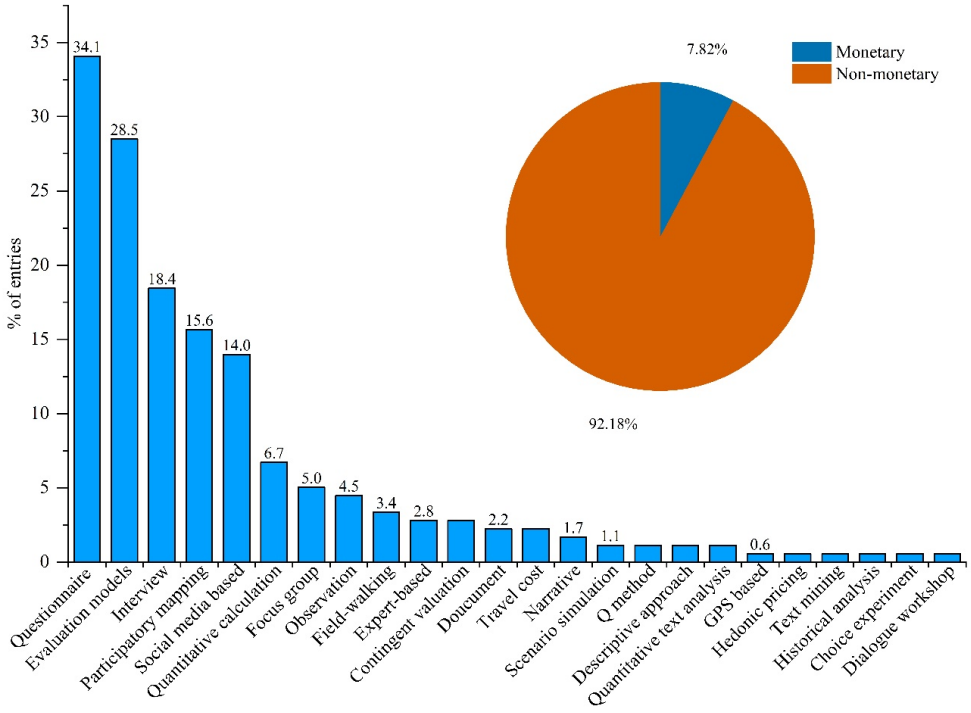

Figure 6. Different methods used in the reviewed studies (% of 179 entries).

4. Discussion

4.1. The Characteristics of Keywords on General Papers

4.1.1. Static Characteristics of CES Research Keywords

We used VOSviewer 1.6.18 to analyze the co-occurrence network of keywords in CES research. It is found that "ecological services", "management", "perception", "benefits", "biodiversity" and "social-ecological systems" are the most discussed topics in the existing research, and each keyword has a certain relationship (Figure 3). There are seven clusters in Figure 3 and cluster 1 has "cultural ecosystem services" as the central keyword. As the largest cluster, cultural ecological services are closely related to cluster 2 (central keyword: ecosystem services), cluster 6 (central keyword: social–ecological systems), and cluster 7 (central keyword: benefits). On the one hand, this shows that cultural services as a branch of ecosystem service research are an important part of ecosystem services. In empirical research, some studies on cultural services are often related to ecological services, such as provisioning services and supporting services. On the other hand, cultural services connect to nature and human beings and are the non-material benefits that people obtain from the natural ecosystem. Cluster 3 has "management" as the core keyword. In this cluster, national parks, cultural landscapes, and other keywords are highly related to management. In practice, many researchers have provided many policy suggestions for the management of national parks and cultural landscapes through research on cultural services [29,58–60]. For example, Brown [58] used the participatory mapping method to investigate the value of Australian National Parks in land use and found that national parks have the potential to manage land use contradictions. Cluster 4 takes "biodiversity" as the core keyword, and stakeholders and cultural services are closely related to it. Biodiversity can provide richer cultural services for different stakeholders [61,62]. However, the protection of biodiversity requires the joint efforts of stakeholders [63]. The central keyword of cluster 5 is "perception", which is closely related to cultural services. In the research of cultural services, the perception of social groups such as community residents and tourists are both hot topics [31,61]. Mapping the perception of cultural services of relevant groups is an effective way to understand the intangible benefits, which is conducive to the visualization of cultural services and provides a basis for the management of local landscapes [64].

4.1.2. Dynamic Evolution of CES Research Keywords

The results of keyword detection show that cultural landscape, pattern, mental health services, social value, and other keywords were hot keywords from 2005 to 2021. To a certain extent, the evolution of keywords is consistent with the key areas of concern in various periods of cultural services. According to the detection results, the hot spots of cultural services can be roughly divided into three stages. The first stage (2005–2011) mainly focused on consumer behavior, cultural diversity, mental health services, and other topics. This stage belongs to the exploration stage of cultural services research. The MEA has promoted the development of CES research. However, as the academic research on it has just started, the topics discussed tend to be diversified, and the various hot keywords have not yet formed a close relationship. Many studies are still discussing the concept and connotation of cultural services, mostly qualitative studies [65,66]. The second stage (2012–2017) paid more attention to cultural landscapes, knowledge related to cultural services, agricultural cultural services, and so on. Since 2012, which coincided with the establishment of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES), more diverse academic fields have been represented by relevant studies [1]. The relationships, mechanisms, approaches, and knowledge systems between nature and human well-being have become the focus of academia. Some authors have conducted mapping research on cultural services generated by cultural landscapes, which promoted the quantitative measurement of cultural services [52,67]. Researchers also found that agricultural production can not only provide material benefits, such as food and wood but also shape agricultural landscapes in the process of humans engaging in agricultural activities [68,69]. These landscapes can also provide non-material benefits such as recreation and leisure for human beings [70–72]. This knowledge is conducive to forming a more comprehensive understanding of cultural services, so as to provide more information for the management of the agricultural landscape [73]. At this stage, the academic circles also began to pay attention to the discussion of research methods and the willingness to pay method alone became a hot topic. In the actual research process, the willingness to pay method has become an important means to measure the economic value of cultural services [74,75]. The third stage (2018–2021) focused on ecological restoration, outdoor recreation services, cultural service demand assessment, cultural service spatial pattern, social media data evaluation methods, and other topics. This stage belongs to the rapid development stage of cultural service research. The number of published documents began to increase explosively every year. The quantitative evaluation of cultural services has been further developed with the support of the development of information technology [76,77]. Therefore, scholars have begun to make more use of geographic information technology to evaluate the spatial pattern of cultural services and the demand for cultural services, which has provided a lot of valuable information for the management and decision-making of cultural services and the protection and development of landscapes.

4.2. The Direction of CES Empirical Research

4.2.1. CES in Developing Countries and Rural Areas Deserve Attention

In this study, 179 identified empirical papers were reviewed using quantitative methods. Of all the papers, many studies focus on the evaluation of CESs in developed countries and regions, especially in Europe and North America [78–80]. However, China has gradually become a focus of the research into CESs, and many empirical studies have emerged recently [81,82]. However, CESs have received limited attention in most developing countries and rural areas. The possible reasons are as follows: first, the relatively backward local economic level has not fully met the basic material needs of residents; second, the knowledge and value systems of most developing countries and indigenous communities have not yet formed effective communication with developed countries, and cultural services have a series of characteristics, such as being intangible, subjective, socially constructed, and dependent on human perception, which all require different tools and methods for their understanding [5,9,83]. This poses a challenge for research on cultural services in

developing countries and rural areas. In recent years, many authors have begun to realize this problem and gradually pay attention to CESs in third-world countries. In fact, when CES research in developed countries is focused, it may be possible to draw some interesting or different conclusions from the CES research in some developing countries. In this sense, authors such as Santarem have conducted research on the supply of CESs in the Sahara-Sahel Ecological Reserve in Africa [84]. In terms of the study object, CESs in urban areas were one of the most important topics in research because some researchers thought that cities are complex adaptive systems embedded within even more complex adaptive ecosystems. In contrast, the attention focused on townships and rural areas does not match their importance in the provision of CES [85]. Therefore, the rural landscape deserves further attention in the research.

4.2.2. The Categories of CES Need Comprehensive Consideration

In all CES categories, many authors believe that aesthetic value is relatively easy for residents and tourists to perceive [86], and recreation and ecotourism can be assessed by landscape indicators or social media data [87]. Therefore, aesthetic value and recreational value are relatively easy to quantify, whether using traditional questionnaires or GIS mapping [88,89]. With the deepening of CES research, many authors advocate for supplementing the CES categories proposed by the MEA. As a result, several categories not explicitly included in the MEA framework are emerging in the research, such as social inclusion [90], identity [72], and existence value [91]. These categories are not only enriching the category of CES but also playing an important role in amending and supplementing the original CES evaluation framework. In addition, it is also conducive to improving people's understanding of the spiritual benefits they have obtained from the natural system and realizing that the generation of non-material benefits is a dynamic process. Although the ecosystem provides people with various CESs, it also greatly meets the spiritual needs of human beings. Moreover, beyond positive services, there is also some negative CESs derived from the human and natural system, namely disservices, which are more derived from the negative effects of human interaction with nature, such as crowdedness, unpleasantness, scariness, and noise [92].

Future research should evaluate comprehensive CES categories to provide more details for CES management. However, this not only requires researchers to establish more comprehensive CES evaluation indicators but also necessitates the development of multiple source data. In addition, the combination of various methods can help evaluate CESs. Generally, depicting the complexity of CES using a single indicator, method, or data point is difficult. Ultimately, the knowledge and methods of different disciplines must be integrated to solve this problem.

4.2.3. Mapping CESs Provides More Detail for Large-Scale Management and Planning

With the rapid development of global urbanization, the CES is of great significance to human health [93–95]. Ecosystem services exhibit strong spatial and temporal characteristics [96,97]. The application of the research method plays a crucial role in the CES evaluation process. This review shows that earlier research considers ecosystem services to be of significant economic value. Therefore, monetary methods have been adopted in many studies, such as the travel cost method [67] and the contingent valuation method [98]. However, in recent years, there has been a change in the understanding of CESs. Many authors believe that CESs are intangible and that it is difficult to assign them a monetary value [9]. Although the monetary method is still regarded as one of the main methods of CES valuation [54], our research results show that only a few studies in the current CES empirical research use this method to assess the value of cultural services (Figure 6). Contrastingly, questionnaires, evaluation models, interviews, and participation mapping have become important methods for evaluating CESs. These methods, such as questionnaires and evaluation models, combined with CES mapping, have become important tools for CES visualization. Therefore, many studies on mapping CESs have emerged, which

has played an important role in promoting the visualization of CESs [99,100]. Mapping CESs can overcome the limitations of economic value estimation and explain the spatial heterogeneity of CES demands more intuitively, thus serving planning and management more effectively [64]. In addition, mapping CESs from the perspective of stakeholders can take into account the ecological knowledge of places and people [101], which is beneficial for broadening people's cognition of CESs. Currently, CES mapping has become an important means for the academic community to analyze the preferences of tourists and locals for CESs. For example, Tobias Plieninger's study [13] found that tourists' and residents' perceptions of CESs are related to landscape features and land-cover forms. This has an important reference value for the planning and management of local cultural landscapes and land use. Moreover, the method of mapping CESs is applicable to large-scale research areas and can compare the evaluation results of cultural services in different regions, serving the planning and management of destinations such as tourist destinations and protected areas.

5. Conclusions

This paper conducts a bibliometric analysis and systematic review of the papers in the CES field. The following conclusions are drawn: (1) the number of publications in cultural service research has increased year by year, and *Ecosystem Services*, *Ecological Indicators*, and *Sustainability* are the top three journals with the most research published in the literature; (2) ecosystem services, benefits, management, social–ecological systems, and perception are closely related to CES research, which are also hot topics in a given field; (3) the results of keyword detection show that cultural landscape, pattern, mental health services, social value, and other keywords are hot keywords from 2005 to 2021; (4) the study of CESs has attracted the attention of developed countries, and the cultural services in urban, marine and coastal areas have become the focus of researchers; (5) recreation and ecotourism and aesthetic values are some common categories of CESs, while knowledge systems and cultural diversity are the two least-evaluated CESs; (6) the evaluation methods of CESs are still dominated by traditional social questionnaires and interviews, and mapping and modeling CESs have also become two important methods in research.

This review combines bibliometric and systematic review methods and obtains a series of valuable results. However, there are still some limitations in this review. First, the papers analyzed in this review are from the WoSCC, and the literature of other databases has not been analyzed. Secondly, this review aimed to explore the CES research hot topics; therefore, the bibliometric analysis carried out in this review is limited to the analysis of keywords, without bibliometric analysis of the authorship, country, references, and other items. Finally, this review uses a quantitative review method to analyze the previous literature only in terms of statistics and quantity. Thus, this review does not instruct the CES research framework or make a sufficient contribution to CES theory. However, it is helpful to recognize the conclusions and characteristics of CES research.

Supplementary Materials: The following supporting information can be downloaded at: https://www.mdpi.com/article/10.3390/su141911845/s1, Geographic location, study object, categories, research method and monetary & non-monetary method.

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Appendix A

Table A1. Set of questions asked for every paper reviewed.

Question	Response Categories	Based on
1. Whether the article is an empirical study	Yes/no	Schaich et al. 2010 [102]
2. Geographic location of the studies	The country that study performed	Cheng et al., 2021 [43]
3. Research object of the studies		Cheng et al., 2021 [43]
4. CES categories addressed by the study	Recreation and ecotourism Aesthetic values Cultural heritage values Spiritual and religious values Educational values Social relations Inspiration General CES Sense of place Cultural diversity Knowledge systems	MEA 2005 [2]
5. CES evaluation method	Questionnaire Evaluation models Interview Participatory mapping Social media based Quantitative calculation Focus group Observation Field-walking Expert-based Contingent valuation Document Travel cost Narrative Scenario simulation Q method Descriptive approach Quantitative text analysis GPS based Hedonic pricing Text mining Historical analysis Dialogue workshop	de Groot et al. 2010 [103] Cheng et al., 2019 [39]
6. Does this paper use monetary or non-monetary methods	Monetary method Non-monetary method	Cheng et al., 2019 [39]

References

1. Huynh, L.T.M.; Gasparatos, A.; Su, J.; Lam, R.D.; Grant, E.I.; Fukushi, K. Linking the nonmaterial dimensions of human-nature relations and human well-being through cultural ecosystem services. *Sci. Adv.* **2022**, *8*, eabn8042. [CrossRef] [PubMed]
2. Millennium Ecosystem Assessment. *Ecosystems and Human Well-Being: Biodiversity Synthesis*; Island Press: Washington, DC, USA, 2005.
3. Diaz, S.; Demissew, S.; Carabias, J.; Joly, C.; Lonsdale, M.; Ash, N.; Larigauderie, A.; Adhikari, J.R.; Arico, S.; Baldi, A.; et al. The IPBES Conceptual Framework—Connecting nature and people. *Curr. Opin. Environ. Sustain.* **2015**, *14*, 1–16. [CrossRef]

4. Costanza, R.; d'Arge, R.; Groot, R.d.; Farber, S. The value of the world's ecosystem services and natural capital. *Nature* **1997**, *387*, 253–260. [CrossRef]
5. Chan, K.M.A.; Guerry, A.D.; Balvanera, P.; Klain, S.; Satterfield, T.; Basurto, X.; Bostrom, A.; Chuenpagdee, R.; Gould, R.; Halpern, B.S.; et al. Where are Cultural and Social in Ecosystem Services? A Framework for Constructive Engagement. *Bioscience* **2012**, *62*, 744–756. [CrossRef]
6. Tengberg, A.; Fredholm, S.; Eliasson, I.; Knez, I.; Saltzman, K.; Wetterberg, O. Cultural ecosystem services provided by landscapes: Assessment of heritage values and identity. *Ecosyst. Serv.* **2012**, *2*, 14–26. [CrossRef]
7. TEEB. *The Economics and Biodiversity: Mainstreaming the Economics of Nature: A Synthesis of the Approach, Conclusion and Recommendations of TEEB*; TEEB: London, UK, 2010.
8. Haines-Young, R.; Potschin, M. *Common International Classification of Ecosystem Services (CICES) V5.1 and Guidance on the Application of the Revised Structure*; Fabis Consulting: Barton, UK, 2018.
9. Chan, K.M.A.; Satterfield, T.; Goldstein, J. Rethinking ecosystem services to better address and navigate cultural values. *Ecol. Econ.* **2012**, *74*, 8–18. [CrossRef]
10. Milcu, A.I.; Hanspach, J.; Abson, D.; Fischer, J. Cultural Ecosystem Services: A Literature Review and Prospects for Future Research. *Ecol. Soc.* **2013**, *18*, 44. [CrossRef]
11. Lyytimäki, J.; Pitkanen, K. Perceived Wellbeing Effects of Ecosystems in Finland. *Hum. Ecol.* **2020**, *48*, 335–345. [CrossRef]
12. Kaltenborn, B.P.; Linnell, J.D.C.; Gomez-Baggethun, E. Can cultural ecosystem services contribute to satisfying basic human needs? A case study from the Lofoten archipelago, northern Norway. *Appl. Geogr.* **2020**, *120*, 102229. [CrossRef]
13. Plieninger, T.; Dijks, S.; Oteros-Rozas, E.; Bieling, C. Assessing, mapping, and quantifying cultural ecosystem services at community level. *Land Use Pol.* **2013**, *33*, 118–129. [CrossRef]
14. Hernandez-Morcillo, M.; Plieninger, T.; Bieling, C. An empirical review of cultural ecosystem service indicators. *Ecol. Indic.* **2013**, *29*, 434–444. [CrossRef]
15. Egerer, M.; Ordonez, C.; Lin, B.B.; Kendal, D. Multicultural gardeners and park users benefit from and attach diverse values to urban nature spaces. *Urban For. Urban Greenin* **2019**, *46*, 14. [CrossRef]
16. Pedersen, E.; Weisner, S.E.B.; Johansson, M. Wetland areas' direct contributions to residents' well-being entitle them to high cultural ecosystem values. *Sci. Total Environ.* **2019**, *646*, 1315–1326. [CrossRef]
17. Ferreira, V.; Barreira, A.P.; Loures, L.; Antunes, D.; Panagopoulos, T. Stakeholders' Engagement on Nature-Based Solutions: A Systematic Literature Review. *Sustainability* **2020**, *12*, 640. [CrossRef]
18. Thompson, B.S.; Friess, D.A. Stakeholder preferences for payments for ecosystem services (PES) versus other environmental management approaches for mangrove forests. *J. Environ. Manag.* **2019**, *233*, 636–648. [CrossRef] [PubMed]
19. Kosanic, A.; Petzold, J. A systematic review of cultural ecosystem services and human wellbeing. *Ecosyst. Serv.* **2020**, *45*, 10. [CrossRef]
20. Martin-Lopez, B.; Gomez-Baggethun, E.; Lomas, P.L.; Montes, C. Effects of spatial and temporal scales on cultural services valuation. *J. Environ. Manag.* **2009**, *90*, 1050–1059. [CrossRef]
21. Gee, K.; Burkhard, B. Cultural ecosystem services in the context of offshore wind farming: A case study from the west coast of Schleswig-Holstein. *Ecol. Complex.* **2010**, *7*, 349–358. [CrossRef]
22. Chen, H.J. Land use trade-offs associated with protected areas in China: Current state, existing evaluation methods, and future application of ecosystem service valuation. *Sci. Total Environ.* **2020**, *711*, 13. [CrossRef]
23. Fraser, J.A.; Diabate, M.; Narmah, W.; Beavogui, P.; Guilavogui, K.; de Foresta, H.; Junqueira, A.B. Cultural valuation and biodiversity conservation in the Upper Guinea forest, West Africa. *Ecol. Soc.* **2016**, *21*, 18. [CrossRef]
24. Guerrero, P.; Moller, M.S.; Olafsson, A.S.; Snizek, B. Revealing Cultural Ecosystem Services through Instagram Images: The Potential of Social Media Volunteered Geographic Information for Urban Green Infrastructure Planning and Governance. *Urban Plan.* **2016**, *1*, 1–17. [CrossRef]
25. Richards, D.R.; Tuncer, B. Using image recognition to automate assessment of cultural ecosystem services from social media photographs. *Ecosyst. Serv.* **2018**, *31*, 318–325. [CrossRef]
26. Bagstad, K.J.; Reed, J.M.; Semmens, D.J.; Sherrouse, B.C.; Troy, A. Linking biophysical models and public preferences for ecosystem service assessments: A case study for the Southern Rocky Mountains. *Reg. Environ. Chang.* **2016**, *16*, 2005–2018. [CrossRef]
27. Ridding, L.E.; Redhead, J.W.; Oliver, T.H.; Schmucki, R.; McGinlay, J.; Graves, A.R.; Morris, J.; Bradbury, R.B.; King, H.; Bullock, J.M. The importance of landscape characteristics for the delivery of cultural ecosystem services. *J. Environ. Manag.* **2018**, *206*, 1145–1154. [CrossRef] [PubMed]
28. Subramanian, D.; Jana, A. Evaluating the cultural ecosystem services of India: Comparison of budget allocations to improve the use value of recreational open spaces. *Ecosyst. Serv.* **2019**, *38*, 9. [CrossRef]
29. Shackleton, C.M.; Blair, A.; De Lacy, P.; Kaoma, H.; Mugwagwa, N.; Dalu, M.T.; Walton, W. How important is green infrastructure in small and medium-sized towns? Lessons from South Africa. *Landsc. Urban Plan.* **2018**, *180*, 273–281. [CrossRef]
30. Canedoli, C.; Bullock, C.; Collier, M.J.; Joyce, D.; Padoa-Schioppa, E. Public Participatory Mapping of Cultural Ecosystem Services: Citizen Perception and Park Management in the Parco Nord of Milan (Italy). *Sustainability* **2017**, *9*, 891. [CrossRef]
31. Jennings, V.; Larson, L.; Yun, J. Advancing Sustainability through Urban Green Space: Cultural Ecosystem Services, Equity, and Social Determinants of Health. *Int. J. Environ. Res. Public Health* **2016**, *13*, 196. [CrossRef]

32. Pert, P.L.; Hill, R.; Maclean, K.; Dale, A.; Rist, P.; Schmider, J.; Talbot, L.; Tawake, L. Mapping cultural ecosystem services with rainforest aboriginal peoples: Integrating biocultural diversity, governance and social variation. *Ecosyst. Serv.* **2015**, *13*, 41–56. [CrossRef]
33. Roux, D.J.; Smith, M.K.S.; Smit, I.P.J.; Freitag, S.; Slabbert, L.; Mokhatla, M.M.; Hayes, J.; Mpapane, N.P. Cultural ecosystem services as complex outcomes of people-nature interactions in protected areas. *Ecosyst. Serv.* **2020**, *43*, 12. [CrossRef]
34. Valles-Planells, M.; Galiana, F.; Van Eetvelde, V. A Classification of Landscape Services to Support Local Landscape Planning. *Ecol. Soc.* **2014**, *19*, 44. [CrossRef]
35. Liquete, C.; Piroddi, C.; Drakou, E.G.; Gurney, L.; Katsanevakis, S.; Charef, A.; Egoh, B. Current Status and Future Prospects for the Assessment of Marine and Coastal Ecosystem Services: A Systematic Review. *PLoS ONE* **2013**, *8*, e67737.
36. Rudl, A.; Machar, I.; Uradnicek, L.; Praus, L.; Pechanec, V. Young urban trees as important structures in the cultural heritage of cities—A case study from Prague. *Environ. Socio-Econ. Stud.* **2019**, *7*, 14–23. [CrossRef]
37. Zhang, H.M.; Huang, R.H.; Zhang, Y.C.; Buhalis, D. Cultural ecosystem services evaluation using geolocated social media data: A review. *Tour. Geogr.* **2020**, 1–23. [CrossRef]
38. Allan, J.D.; Smith, S.D.P.; McIntyre, P.B.; Joseph, C.A.; Dickinson, C.E.; Marino, A.L.; Biel, R.G.; Olson, J.C.; Doran, P.J.; Rutherford, E.S.; et al. Using cultural ecosystem services to inform restoration priorities in the Laurentian Great Lakes. *Front. Ecol. Environ.* **2015**, *13*, 418–424. [CrossRef]
39. Cheng, X.; Van Damme, S.; Li, L.; Uyttenhove, P. Evaluation of cultural ecosystem services: A review of methods. *Ecosyst. Serv.* **2019**, *37*, 100925. [CrossRef]
40. Pauna, V.H.; Picone, F.; Le Guyader, G.; Buonocore, E.; Franzese, P.P. The scientific research on ecosystem services: A bibliometric analysis. *Ecol. Quest.* **2018**, *29*, 53–62.
41. Sun, S.; Jiang, Y.; Zheng, S. Research on Ecological Infrastructure from 1990 to 2018: A Bibliometric Analysis. *Sustainability* **2020**, *12*, 2304. [CrossRef]
42. Mongeon, P.; Paul-Hus, A. The journal coverage of Web of Science and Scopus: A comparative analysis. *Scientometrics* **2015**, *106*, 213–228. [CrossRef]
43. Cheng, X.; Damme, S.V.; Uyttenhove, P. A review of empirical studies of cultural ecosystem services in urban green infrastructure. *J. Environ. Manag.* **2021**, *293*, 112895. [CrossRef]
44. Perianes-Rodriguez, A.; Waltman, L.; van Eck, N.J. Constructing bibliometric networks: A comparison between full and fractional counting. *J. Informetr.* **2016**, *10*, 1178–1195. [CrossRef]
45. Mejjad, N.; Rovere, M. Understanding the Impacts of Blue Economy Growth on Deep-Sea Ecosystem Services. *Sustainability* **2021**, *13*, 12478. [CrossRef]
46. Gao, Y.; Xu, Y.; Zhu, Y.; Zhang, J. An analysis of the hotspot and frontier of mine eco-environment restoration based on big data visualization of VOSviewer and CiteSpace. *Geol. Bull. China* **2018**, *37*, 2144–2153.
47. Xie, H.L.; Zhang, Y.W.; Choi, Y.; Li, F.Q. A Scientometrics Review on Land Ecosystem Service Research. *Sustainability* **2020**, *12*, 2959. [CrossRef]
48. Chen, C. Detecting and visualizing emerging trends and transient patterns in scientific literature. *J. Am. Soc. Inf. Sci. Technol.* **2006**, *57*, 359–377. [CrossRef]
49. Lu, Z.; Li, W.; Wang, Y.; Zhou, S. Bibliometric Analysis of Global Research on Ecological Networks in Nature Conservation from 1990 to 2020. *Sustainability* **2022**, *14*, 4925. [CrossRef]
50. Xu, P.; Xie, M.; Zhou, W.; Suo, A. Research on Fishery Resource Assessment and Sustainable Utilization (FRASU) during 1990-2020: A bibliometric review. *Glob. Ecol. Conserv.* **2021**, *29*, e01720. [CrossRef]
51. Chen, C.; Hu, Z.; Liu, S.; Tseng, H. Emerging trends in regenerative medicine: A scientometric analysis in CiteSpace. *Expert Opin. Biol. Ther.* **2020**, *12*, 593–608. [CrossRef]
52. Fletcher, R.; Baulcomb, C.; Hall, C.; Hussain, S. Revealing marine cultural ecosystem services in the Black Sea. *Mar. Pol.* **2014**, *50*, 151–161. [CrossRef]
53. Michaelis, A.K.; Walton, W.C.; Webster, D.W.; Shaffer, L.J. Cultural ecosystem services enabled through work with shellfish. *Mar. Pol.* **2021**, *132*, 104689. [CrossRef]
54. Hirons, M.; Comberti, C.; Dunford, R. Valuing Cultural Ecosystem Services. *Annu. Rev. Environ. Resour.* **2016**, *41*, 545–574. [CrossRef]
55. Yang, G.; Yu, Z.; Zhang, J.; Kristensen, L.S. From preference to landscape sustainability: A bibliometric review of landscape preference research from 1968 to 2019. *Ecosyst. Health Sustain.* **2018**, *7*, 1948355. [CrossRef]
56. Azevedo, A. Using social media photos as a proxy to estimate the recreational value of (im)movable heritage: The Rubjerg Knude (Denmark) lighthouse. *Int. J. Contemp. Hosp. Manag.* **2021**, *33*, 2283–2303. [CrossRef]
57. Wang, B.; Zhang, Q.; Cui, F. Scientific research on ecosystem services and human well-being: A bibliometric analysis. *Ecol. Indic.* **2021**, *125*, 107449. [CrossRef]
58. Brown, M.I.; Pearce, T.; Leon, J.; Sidle, R.; Wilson, R. Using remote sensing and traditional ecological knowledge (TEK) to understand mangrove change on the Maroochy River, Queensland, Australia. *Appl. Geogr.* **2018**, *94*, 71–83. [CrossRef]
59. da Mota, V.T.; Pickering, C. Using social media to assess nature-based tourism: Current research and future trends. *J. Outdo. Recreat. Tour. Res. Plan.* **2020**, *30*, 11.

60. Bogdan, S.M.; Stupariu, I.; Andra-Toparceanu, A.; Nastase, I.I. Mapping social values for cultural ecosystem services in a mountain landscape in the Romanian Carpathians. Carpath. *J. Earth Environ. Sci.* **2019**, *14*, 199–208.
61. Soga, M.; Gaston, K.J.; Koyanagi, T.F.; Kurisu, K.; Hanaki, K. Urban residents' perceptions of neighbourhood nature: Does the extinction of experience matter? *Biol. Conserv.* **2016**, *203*, 143–150. [CrossRef]
62. Darvill, R.; Lindo, Z. The inclusion of stakeholders and cultural ecosystem services in land management trade-off decisions using an ecosystem services approach. *Landsc. Ecol.* **2016**, *31*, 533–545. [CrossRef]
63. Santruckova, M.; Demkova, K.; Dostalek, J.; Frantik, T. Manor gardens: Harbors of local natural habitats? *Biol. Conserv.* **2017**, *205*, 16–22. [CrossRef]
64. Peña, L.; Casado-Arzuaga, I.; Onaindia, M. Mapping recreation supply and demand using an ecological and a social evaluation approach. *Ecosyst. Serv.* **2015**, *13*, 108–118. [CrossRef]
65. Bennett, E.M.; Peterson, G.D.; Levitt, E.A. Looking to the future of ecosystem services. *Ecosystems* **2005**, *8*, 125–132. [CrossRef]
66. Palmer, M.A.; Bernhardt, E.S.; Chornesky, E.A.; Collins, S.L.; Dobson, A.P.; Duke, C.S.; Gold, B.D.; Jacobson, R.B.; Kingsland, S.E.; Kranz, R.H.; et al. Ecological science and sustainability for the 21st century. *Front. Ecol. Environ.* **2005**, *3*, 4–11. [CrossRef]
67. Paracchini, M.L.; Zulian, G.; Kopperoinen, L.; Maes, J.; Schagner, J.P.; Termansen, M.; Zandersen, M.; Perez-Soba, M.; Scholefield, P.A.; Bidoglio, G. Mapping cultural ecosystem services: A framework to assess the potential for outdoor recreation across the EU. *Ecol. Indic.* **2014**, *45*, 371–385. [CrossRef]
68. Tekken, V.; Spangenberg, J.H.; Burkhard, B.; Escalada, M.; Stoll-Kleemann, S.; Dao Thanh, T.; Settele, J. "Things are different now": Farmer perceptions of cultural ecosystem services of traditional rice landscapes in Vietnam and the Philippines. *Ecosyst. Serv.* **2017**, *25*, 153–166. [CrossRef]
69. van Zanten, B.T.; Van Berkel, D.B.; Meentemeyer, R.K.; Smith, J.W.; Tieskens, K.F.; Verburg, P.H. Continental-scale quantification of landscape values using social media data. *Proc. Natl. Acad. Sci. USA* **2016**, *113*, 12974–12979. [CrossRef]
70. Navarro, L.M.; Pereira, H.M. Rewilding Abandoned Landscapes in Europe. *Ecosystems* **2012**, *15*, 900–912. [CrossRef]
71. van Zanten, B.T.; Koetse, M.J.; Verburg, P.H. Economic valuation at all cost? The role of the price attribute in a landscape preference study. *Ecosyst. Serv.* **2016**, *22*, 289–296. [CrossRef]
72. Auer, A.; Maceira, N.; Nahuelhual, L. Agriculturisation and trade-offs between commodity production and cultural ecosystem services: A case study in Balcarce County. *J. Rural Stud.* **2017**, *53*, 88–101. [CrossRef]
73. Sherrouse, B.C.; Semmens, D.J.; Ancona, Z.H.; Brunner, N.M. Analyzing land-use change scenarios for trade-offs among cultural ecosystem services in the Southern Rocky Mountains. *Ecosyst. Serv.* **2017**, *26*, 431–444. [CrossRef]
74. Barrena, J.; Nahuelhual, L.; Baez, A.; Schiappacasse, I.; Cerda, C. Valuing cultural ecosystem services: Agricultural heritage in Chiloe island, southern Chile. *Ecosyst. Serv.* **2014**, *7*, 66–75. [CrossRef]
75. Kenter, J.O.; Reed, M.S.; Fazey, I. The Deliberative Value Formation model. *Ecosyst. Serv.* **2016**, *21*, 194–207. [CrossRef]
76. Langemeyer, J.; Calcagni, F.; Baro, F. Mapping the intangible: Using geolocated social media data to examine landscape aesthetics. *Land Use Pol.* **2018**, *77*, 542–552. [CrossRef]
77. Foltete, J.C.; Ingensand, J.; Blanc, N. Coupling crowd-sourced imagery and visibility modelling to identify landscape preferences at the panorama level. *Landsc. Urban Plan.* **2020**, *197*, 11. [CrossRef]
78. Bagstad, K.J.; Semmens, D.J.; Ancona, Z.H.; Sherrouse, B.C. Evaluating alternative methods for biophysical and cultural ecosystem services hotspot mapping in natural resource planning. *Landsc. Ecol.* **2017**, *32*, 77–97. [CrossRef]
79. Gould, R.K.; Ardoin, N.M.; Woodside, U.; Satterfield, T.; Hannahs, N.; Daily, G.C. The forest has a story: Cultural ecosystem services in Kona, Hawai'i. *Ecol. Soc.* **2014**, *19*, 29. [CrossRef]
80. Graves, R.A.; Pearson, S.M.; Turner, M.G. Effects of bird community dynamics on the seasonal distribution of cultural ecosystem services. *Ambio* **2019**, *48*, 280–292. [CrossRef]
81. Xu, H.Y.; Zhao, G.H.; Fagerholm, N.; Primdahl, J.; Plieninger, T. Participatory mapping of cultural ecosystem services for landscape corridor planning: A case study of the Silk Roads corridor in Zhangye, China. *J. Environ. Manag.* **2020**, *264*, 10. [CrossRef]
82. Xu, Z.H.; Wei, H.J.; Fan, W.G.; Wang, X.C.; Huang, B.L.; Lu, N.H.; Ren, J.H.; Dong, X.B. Energy modeling simulation of changes in ecosystem services before and after the implementation of a Grain-for-Green program on the Loess Plateau-A case study of the Zhifanggou valley in Ansai County, Shaanxi Province, China. *Ecosyst. Serv.* **2018**, *31*, 32–43. [CrossRef]
83. Dickinson, D.C.; Hobbs, R.J. Cultural ecosystem services: Characteristics, challenges and lessons for urban green space research. *Ecosyst. Serv.* **2017**, *25*, 179–194. [CrossRef]
84. Santarem, F.; Saarinen, J.; Brito, J.C. Mapping and analysing cultural ecosystem services in conflict areas. *Ecol. Indic.* **2020**, *110*, 105943. [CrossRef]
85. Csurgó, B.; Smith, M.K. The value of cultural ecosystem services in a rural landscape context. *J. Rural Stud.* **2021**, *86*, 76–86. [CrossRef]
86. Bachi, L.; Ribeiro, S.C.; Hermes, J.; Saadi, A. Cultural Ecosystem Services (CES) in landscapes with a tourist vocation: Mapping and modeling the physical landscape components that bring benefits to people in a mountain tourist destination in southeastern Brazil. *Tourism Manag.* **2020**, *77*, 104017. [CrossRef]
87. Arslan, E.S.; Orucu, O.K. MaxEnt modelling of the potential distribution areas of cultural ecosystem services using social media data and GIS. *Environ. Dev. Sustain.* **2021**, *23*, 2655–2667. [CrossRef]

88. Bieling, C.; Plieninger, T.; Schaich, H. Patterns and causes of land change: Empirical results and conceptual considerations derived from a case study in the Swabian Alb, Germany. *Land Use Pol.* **2013**, *35*, 192–203. [CrossRef]
89. Brancalion, P.H.S.; Cardozo, I.V.; Camatta, A.; Aronson, J.; Rodrigues, R.R. Cultural Ecosystem Services and Popular Perceptions of the Benefits of an Ecological Restoration Project in the Brazilian Atlantic Forest. *Restor. Ecol.* **2014**, *22*, 65–71. [CrossRef]
90. Giedych, R.; Maksymiuk, G. Specific Features of Parks and Their Impact on Regulation and Cultural Ecosystem Services Provision in Warsaw, Poland. *Sustainability* **2017**, *9*, 792. [CrossRef]
91. Hale, R.L.; Cook, E.M.; Beltran, B.J. Cultural ecosystem services provided by rivers across diverse social-ecological landscapes: A social media analysis. *Ecol. Indic.* **2019**, *107*, 10. [CrossRef]
92. Loc, H.H.; Diep, N.T.H.; Tuan, V.T.; Shimizu, Y. An analytical approach in accounting for social values of ecosystem services in a Ramsar site: A case study in the Mekong Delta, Vietnam. *Ecol. Indic.* **2018**, *89*, 118–129. [CrossRef]
93. Julian, J.P.; Daly, G.S.; Weaver, R.C. University Students' Social Demand of a Blue Space and the Influence of Life Experiences. *Sustainability* **2018**, *10*, 3178. [CrossRef]
94. Marshall, N.A.; Dunstan, P.; Pert, P.; Thiault, L. How people value different ecosystems within the Great Barrier Reef. *J. Environ. Manag.* **2019**, *243*, 39–44. [CrossRef] [PubMed]
95. Martin, C.L.; Momtaz, S.; Gaston, T.; Moltschaniwskyj, N.A. Estuarine cultural ecosystem services valued by local people in New South Wales, Australia, and attributes important for continued supply. *Ocean Coast. Manag.* **2020**, *190*, 9. [CrossRef]
96. Havinga, I.; Bogaart, P.W.; Hein, L.; Tuia, D. Defining and spatially modelling cultural ecosystem services using crowdsourced data. *Ecosyst. Serv.* **2020**, *43*, 14. [CrossRef]
97. Paulin, M.J.; Rutgers, M.; de Nijs, T.; Hendriks, A.J.; Koopman, K.R.; Van Buul, T.; Frambach, M.; Sardano, G.; Breure, A.M. Integration of local knowledge and data for spatially quantifying ecosystem services in the Hoeksche Waard, the Netherlands. *Ecol. Model.* **2020**, *438*, 13. [CrossRef]
98. Rewitzer, S.; Huber, R.; Gret-Regamey, A.; Barkmann, J. Economic valuation of cultural ecosystem service changes to a landscape in the Swiss Alps. *Ecosyst. Serv.* **2017**, *26*, 197–208. [CrossRef]
99. Thiele, J.; Albert, C.; Hermes, J.; von Haaren, C. Assessing and quantifying offered cultural ecosystem services of German river landscapes. *Ecosyst. Serv.* **2020**, *42*, 101080. [CrossRef]
100. Vrbicanova, G.; Kaisova, D.; Mocka, M.; Petrovic, F.; Mederly, P. Mapping Cultural Ecosystem Services Enables Better Informed Nature Protection and Landscape Management. *Sustainability* **2020**, *12*, 2138. [CrossRef]
101. Fagerholm, N.; Kayhko, N.; Ndumbaro, F.; Khamis, M. Community stakeholders' knowledge in landscape assessments—Mapping indicators for landscape services. *Ecol. Indic.* **2012**, *18*, 421–433. [CrossRef]
102. Schaich, H.; Bieling, C.; Plieninger, T. Linking ecosystem services with cultural landscape research. *Gaia* **2010**, *19*, 269–277. [CrossRef]
103. De Groot, R.S.; Alkemade, R.; Braat, L.; Hein, L.; Willemen, L. Challenges in integrating the concept of ecosystem services and values in landscape planning, management, and decision making. *Ecol. Complex.* **2010**, *7*, 260–272. [CrossRef]