

Review

A Review of Empirical Studies of Cultural Ecosystem Services in National Parks: Current Status and Future Research

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Abstract: Cultural ecosystem services (CES) provided by national parks (NP) have been increasingly recognized and appreciated by the public and researchers. However, they are often under-represented in ecosystem services evaluations due to their intangible nature. As a result, their application in supporting NP conservation and management remains limited. To map the knowledge generated by CES within NP and to support NP practices, this study conducted a review of 199 empirical studies to identify the geographic distribution of research, specific NP habitats/ecosystems that supply CES, frequently addressed CES subcategories, CES evaluation methods, and challenges and prospects for future studies. The results revealed the following: a disparity exists in the global distribution of studies, and the majority of research is conducted in Europe and the USA, with limited knowledge about CES in developing countries. Studies on CES derived from specific NP habitats/ecosystems are limited, and not all the services have received equal attention. Multiple evaluation methods have been employed to assess CES, primarily relying on non-monetary approaches. Among these, participatory mapping-related methods and social-media-based methods are widely favored by researchers. Based on those findings, this study makes the following recommendations: (1) further research is needed in order to investigate a wider range of NP habitats/ecosystems worldwide, especially in developing countries; (2) comprehensive evaluation methods should be employed, considering all services, especially those less addressed; (3) more diverse methods for evaluating CES should be developed, with a particular emphasis on combining various methods to enhance evaluation accuracy; (4) the use of diverse techniques, such as machine learning for social-media-based methods, is encouraged to support data collection and processing to improve the efficacy of evaluation; (5) further studies on the relationships between CES and NP features can assist stakeholders in more effectively addressing CES by enabling the management and adjustment of these features; (6) future studies should integrate CES evaluation into an ecosystem services framework to support application in NP conservation and sustainable management.

Keywords: national parks; cultural ecosystem services; evaluation methods



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1. Introduction

In recent decades, visits to national parks have rapidly increased worldwide [1,2]. National parks (NP) provide diverse ecosystem services, including provisioning services (e.g., wood, water), regulation services (e.g., pollination regulation, air regulation), supporting services (e.g., biomass production, nutrient cycling), and cultural services [3]. Cultural ecosystem services (CES) refer to those non-material benefits people obtain from ecosystems [4]. The concept has garnered growing acknowledgment as a useful tool with which to support environmental management and decision making [5–8]. Moreover, CES are closely related to humans and have the potential to enhance public awareness of, and motivation for, environmental conservation [9,10]. NP provide a variety of CES, for instance, NP provide opportunities for individuals to experience nature, engage in recreational activities, appreciate scenic beauty, and enhance their health and well-being, all of which are highly valued and appreciated by the public [2,11,12]. Moreover, nature-based tourism, one of

the CES, plays a pivotal role in generating significant income for national parks, thereby contributing to a sustainable conservation solution [13]. Furthermore, national parks contain numerous cultural landscapes. The concept of the cultural landscape encompasses a wide array of expressions reflecting the interplay between humanity and the natural world, yielding a multitude of CES. This paper adopts the definition of the cultural landscape proposed by the U.S. National Park Service, which characterizes it as a geographical expanse encompassing cultural and natural elements, along with the wildlife or domesticated animals within, linked to a historical event, endeavor, figure, or displaying other examples of cultural or aesthetic significance. For instance, Maldonado et al. [14] highlighted the presence of diverse cultural heritage and the extensive cultivation of traditional agricultural systems, including olive groves and other crops, within protected areas and national parks. Cultural landscapes serve as a nexus between nature and culture, encompassing both tangible and intangible heritage, as well as cultural and biological diversity [15,16]. Nevertheless, the examination of the cultural aspects of protected areas or national parks has progressed slowly and has proven to be intricate. For instance, in most European countries, there is a lack of fundamental identification, inventories, and assessments of cultural landscapes and their associated values within protected areas. Furthermore, cultural values currently have a limited role in Natura 2000 delineation and management, underscoring the insufficient attention dedicated to cultural landscapes [17–19]. Protected areas and national parks have been established worldwide with the primary objective of preserving biodiversity and regulating land use changes. However, managing such areas becomes more challenging in regions dominated by cultural landscapes. These multifunctional landscapes, characterized by cultural features, sustain rich biodiversity and a variety of CES through traditional cultural practices. Managing such landscapes has proven to be a complex task [20]. The introduction of CES assessment promotes collaborative efforts among various stakeholders involved in protected area management. Collaboration, cooperation, and education are crucial elements in this endeavor [21]. Developing innovative approaches that foster a comprehensive understanding of CES within NP will enhance the capacity for more effective and holistic conservation. However, cultural landscapes are often inadequately inventoried and evaluated within protected natural areas. For example, Vlami et al. [19], in their assessment, found that Greece’s primary system of protected natural areas fails to account for “cultural values”, leading to the exclusion of numerous significant cultural landscape features such as archaeological sites and traditional settlements that are in close proximity to or adjacent to these protected zones.

Moreover, the dual function of NP as both tourist and recreational destinations and tools for nature conservation has brought to the forefront concerns regarding environmental issues in these vulnerable protected areas [22,23]. For example, studies conducted by Balmford et al. [24] and Aronson et al. [25] have demonstrated that the recent surge in visitation to places such as U.S. national parks is associated with deliberate or inadvertent visitor behaviors that can harm the natural resources essential for the CES linked to well-being. Gutzwiller et al. [26] also found that recreational activities in NP have been correlated with declines in biodiversity, including the loss of wildlife, soil, and vegetation. This is why, despite NP being the most commonly employed policy tool for biodiversity conservation, the effective management of NP is frequently hindered by conflicts primarily linked to the social impacts imposed on local communities and other users as a result of their establishment [3]. Therefore, there is an urgent need to devise better conservation mechanisms that provide clear benefits to people, and capitalizing on CES evaluation may be one way to achieve this goal. The identification of CES furnished by NP and the strategic alignment of management efforts with local concerns can foster trust, garner increased political backing, and ultimately lead to improved environmental outcomes.

At present, the ecosystem services paradigm has been employed to bridge disciplinary boundaries and justify conservation action. However, despite widespread recognition that CES is significant in informing stakeholders and decision makers regarding environmental conservation and management, it too-often remains absent from ecosystem

service assessments [27,28]. This risks a lack of understanding and consideration of CES by decision-makers. Moreover, ecosystem service research has long been dominated by a monetary interpretation of value, neglecting other social perspectives on the importance of ecosystems for human well-being for a long time. To integrate into the ecosystem services framework and support decision-making, it is essential to identify the CES that are provided. [29]. However, evaluation of CES remains one of the most difficult and least accomplished tasks due to their abstract characteristic [30]. The limited availability of data presents a significant barrier to assessing CES, and the data primarily need to be collected through detailed and specialized surveys [31,32]. Furthermore, the demarcation between various CES categories is often unclear, potentially resulting in issues related to double-counting [30]. For instance, recreation and aesthetics frequently co-occur, making it challenging to differentiate the true value of each service [33]. Sets of CES that commonly co-occur are referred to as “bundles”, and the interactions between these services can occur as trade-offs, where the enhancement of one service leads to a decline in another, or as synergies, where the utilization of one service directly enhances another. These complexities add to the challenge of assessing CES [34,35].

In recent decades, significant efforts have been dedicated to the development of methods and tools for assessing CES [30,36–38]. The evaluation of CES has its origins in economic realms during the 1970s and 1980s [39]. Braat et al. [36] and Hirons et al. [38] succinctly categorized these methods into monetary and non-monetary approaches. Monetary methods refer to evaluation outcomes expressed in monetary terms. For instance, “market price” is a monetary method used to estimate the economic values of CES by considering the prices of products bought and sold in the market, such as entrance fees paid at parks for calculating recreation and ecotourism. Non-monetary methods, such as interviews, are frequently employed to gain a deeper understanding of how and why individuals value CES, which can facilitate a better comprehension of those ignored CES such as a sense of place or inspiration. Furthermore, Spangenberg and Settele [40] and Christie et al. [37] categorized evaluation methods based on revealed preference and stated preference classifications. For instance, the revealed preference method involves observing actual markets associated with CES or analyzing behaviors and documents to indirectly deduce human preferences for CES; on the other hand, the stated preference method entails creating a hypothetical market and directly asking respondents to express their willingness to pay for CES, or directly inquiring about their values to assess CES. With the development of evaluation methods, diverse CES evaluation studies have been conducted within NP, targeting various specific habitats/ecosystems, such as forests [41,42], mountains [11,43], lakes [11,44], coastal areas [45,46], and more. For instance, Angradi et al. [44], in the Great Lakes Areas, conducted their evaluation by analyzing photographs shared on social media. Yoshimura and Hiura [47] utilized geotagged photos to map the aesthetic value of landscape in NP in Hokkaido.

While there has been a growing focus on addressing the issue of CES evaluation, a systematic review of CES generated by NP is conspicuously absent. Therefore, this paper aims to conduct a systematic literature review on empirical studies about CES within NP to elucidate the current state of knowledge. Specifically, this study focuses on the geographic distribution of empirical studies, specific habitats/ecosystems that supply CES, subcategories frequently addressed, the implications and applications of evaluation methods, identification of knowledge gaps, and the challenges and prospects for future studies.

2. Methods

2.1. Literature Selection

A systematic literature review was conducted based on two databases—ISI Web of Science and Science Direct—using the search terms “national park*” AND “cultural ecosystem service*” in titles, abstracts, and key words. This study sets the timespan from 2005 to 2022 because the significant Millennium Ecosystem Assessment synthesis reports

was released in 2005, which officially highlighted the concept of CES, after which it gained increasing attention from the mainstream.

The review resulted in a total of 490 references from Science Direct and 110 references from ISI Web of Science. This study further eliminated the gray literature, duplicates, and non-English language, leaving 528 papers. Then articles were initially screened, and articles were excluded when the contents bore no relation to NP and CES. For example, studies about urban parks were excluded, such as the studies by Campbell et al. [48], Tuhkanen et al. [49], and Zapata-Caldas et al. [50]. Then, the remaining 262 articles were read in detail. This study further excluded 63 studies that were primarily conceptual or lacked any pertinent empirical elements, as the primary objective was to review empirical studies to provide evidence to support practice. Ultimately, a total of 199 articles were selected as the representative dataset for the analysis. Table 1 shows the literature selection process.

Table 1. Literature selection process.

Source	Number of Papers
Paper search in ISI Web of Science	110
Papers search in Scopus	490
Removing duplicates, gray literature	−72
Initially text screening	−266
Thorough Full-Text Screening	−63
Analysis studies	199

2.2. Classification of Identified Papers

This study provided a comprehensive characterization of each paper by using the following attributes: (1) geographic distribution of studies; (2) the specific habitats/ecosystems of NP; (3) the specific CES categories addressed; and (4) methods employed for evaluating CES within the paper.

2.2.1. Geographic Distribution

This study recorded specific geographic locations during the process of reviewing each paper. Specifically, this study recorded the country in which the study was conducted, thereby delineating the geographic distribution. If a study was conducted in several countries, this study noted its location using a regional description, such as “EU continent” or “Asia continent” if the studies were conducted in a same continent, or “Globe” if the studies were conducted in different continents.

2.2.2. Habitats/Ecosystems of National Parks

Researchers have different focuses on different NP habitats/ecosystems based on their backgrounds and research purposes. For instance, Karrasch et al. [51], Sandhu et al. [52], and Ruiz-Frau et al. [45] focused on coasts. Sherrouse et al. [27] focused on forests, and Dobbie [53] focused on wetlands. Meanwhile, many researchers took NP as a whole as their topic of study, which includes various habitats. For example, Nahuelhual et al. [54] researched national parks, includes various ecosystems such as lakes, rivers, waterfalls, volcanoes, snow patches, pristine forests, and hot springs.

With the aim of characterizing NP classes, this study included all the scopes mentioned above and proposed that NP types include the follow: (1) specific NP types, such as forests, coasts, wetlands, or mountains, which were categorized separately and recorded accordingly; and (2) “national parks”, which was recorded as an independent type when studies did not specifically target specific habitats but instead considered the national park as a whole, as exemplified by Nahuelhual et al. [54].

2.2.3. Classification of CES Categories

Standardized classifications have been proposed by the Millennium Ecosystem Assessment (MEA, www.millenniumassessment.org, accessed on 10 October 2023), the

Common International Classification of Ecosystem Services (CICES, <http://cices.eu>, accessed on 10 October 2023), and The Economics of Ecosystems and Biodiversity (TEEB, www.teebweb.org, accessed on 10 October 2023), which include categories such as aesthetic, recreational, and inspirational values. These categories are increasingly recognized as a comprehensive framework which can and should be adapted to local contexts [55]. To ensure consistency in the understanding of CES, this study selected the definitions and classifications by the MEA, which have consistently been referenced and emphasized in numerous studies.

These categories encompass the following: recreation and ecotourism; aesthetic values; cultural diversity; spiritual and religious values; knowledge systems; educational values; inspiration; social relations; sense of place; and cultural heritage values. Knowledge systems and educational values were combined into one category and recorded as “educational values” because of their similarity [56]. Moreover, this study identified additional types and integrated them into the MEA classification system. Categories that did not align with the classification criteria were excluded. Additionally, when researchers referenced CES as a standalone entity without specifying a particular type in their studies, it was recorded as a separate category “General CES”.

2.2.4. Classification of CES Evaluation Methods

This study systematically reviewed the methodologies employed for assessing CES in each respective paper. Drawing upon existing CES evaluation studies by Christie et al. [37], Hirons et al. [38], and Cheng et al. [30], etc., the CES evaluation methods were systematically categorized into monetary methods and non-monetary methods. Subsequently, an iterative approach was employed to meticulously evaluate the methods utilized within each of the reviewed papers and obtain a final set of methods. Ultimately, the methods employed in the reviewed papers were counted. If more than one method was used in one paper, they were recorded.

3. Results

The results presented in this review are derived from two databases, and details are provided in the Supplementary Materials. The 199 publications included in this review were published within the last decade, and none were found prior to 2012 (Figure 1). Following this study, the results are presented in four key aspects, addressing the research questions and constructing a knowledge map. These aspects encompass the geographic distribution, the habitats/ecosystems of NP, the types of CES assessed, and the evaluation methods employed in the studies.

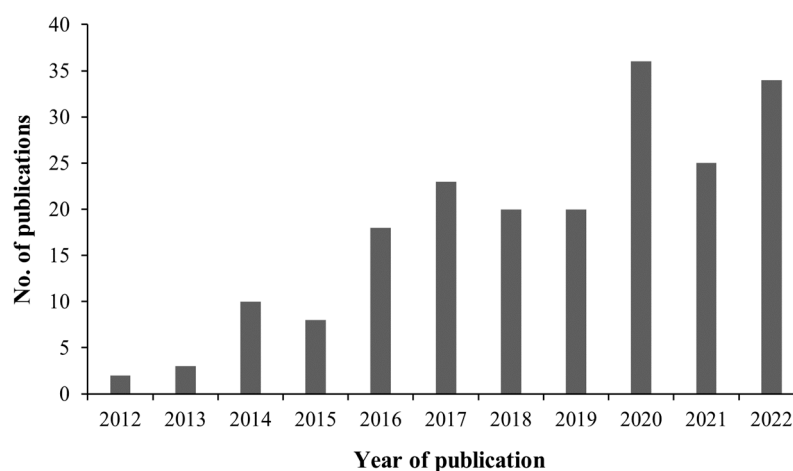


Figure 1. Number of publications per year that addressed CES of NP.

3.1. Geographic Distribution

The reviewed studies predominantly focused on Europe, with 77 studies, followed by Asia and North America, with 41 and 24 studies, respectively. Africa contributed 20 studies, with the majority of them concentrated in South Africa, totaling 13 studies. Figure 2 further highlights the top 10 countries, with the USA leading the list with 20 studies. The UK was the second-highest-ranking country, with 14 studies, and south Africa ranked third, with 13 studies. Additionally, five papers encompassed cross-studies conducted in various countries and at the global level.

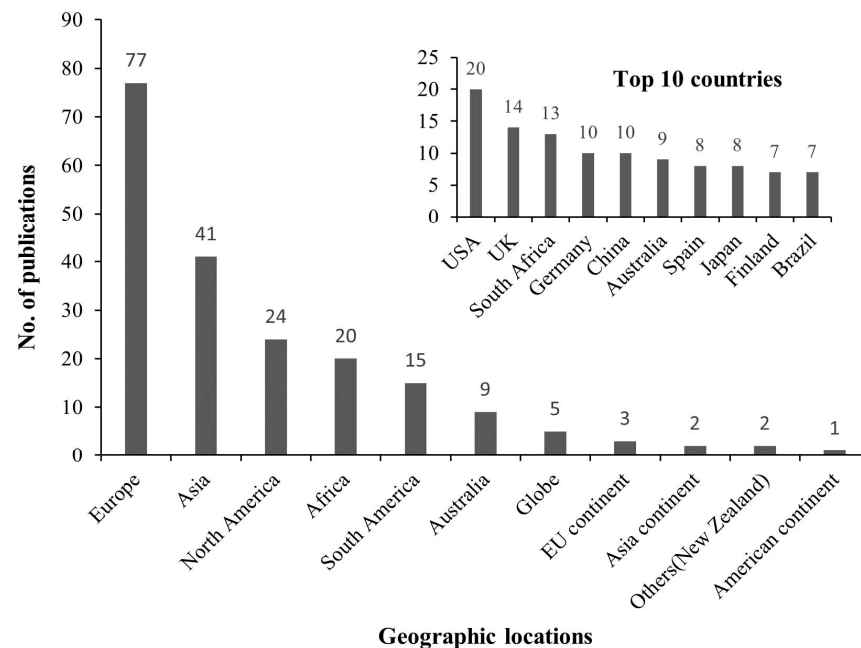


Figure 2. Geographic distribution of studies.

3.2. Habitats/Ecosystems of National Parks

Clearly, over half of the studies primarily focused their research efforts on NP as a comprehensive category (122 studies), followed by forests with 22 studies, coastlines with 15 studies, and bodies of water (such as lakes and rivers) with 11 studies. The remaining studies were directed towards mountains, marine areas, wetlands or islands, and others. Please refer to Figure 3 and the Supplementary Materials for more details.

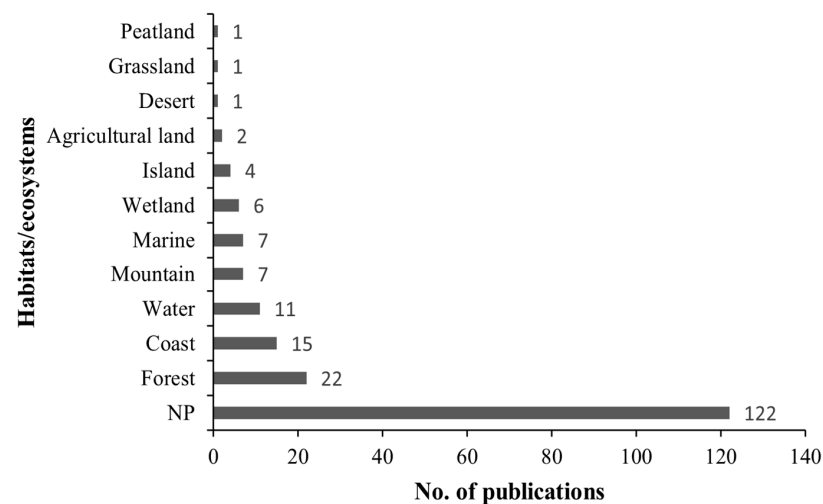


Figure 3. NP Habitats/ecosystems of studies.

3.3. CES Categories

Figure 4 shows that 76 studies were exclusively dedicated to a single service, while 69 studies concurrently explored multiple categories of cultural services. Furthermore, 54 studies comprehensively investigated cultural services as a whole. Figure 4 also illustrates that recreation and ecotourism held the foremost position with 126 studies, followed by aesthetic values with 66 studies, spiritual and religious values with 41 studies, educational values with 40 studies, and cultural heritage values with 40 studies. In contrast, cultural diversity, social relations, and inspiration received comparatively less attention, with 4, 15, and 20 studies, respectively.

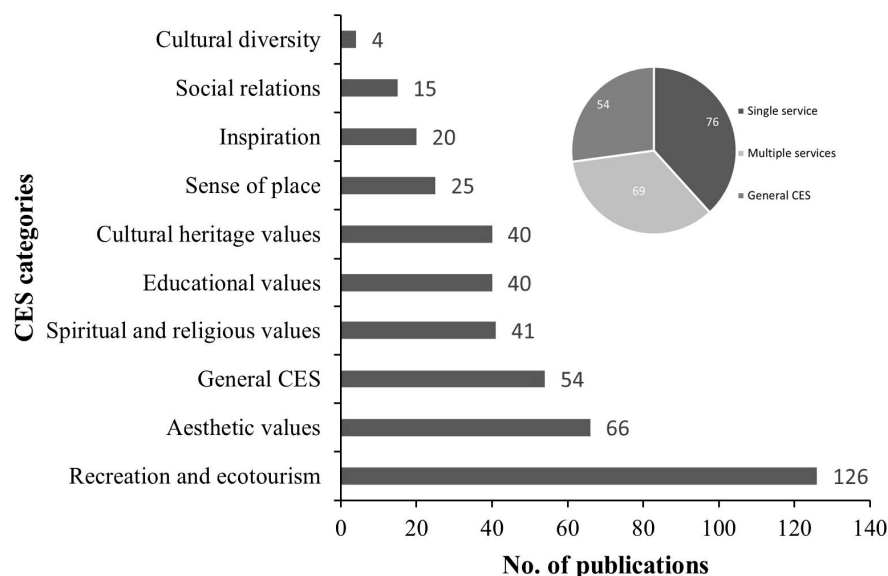


Figure 4. Addressed CES categories of studies.

3.4. CES Evaluation Methods

Twenty methods were employed for evaluating CES within national parks. Figure 5 illustrates that studies primarily focused on CES predominantly relied on non-monetary methods, totaling 15 methods. Social-media-based methods ranked first, with 49 studies. Various social databases were leveraged, including platforms such as Facebook, Flickr, Google, Strava, Wikilocs, and others, to collect relevant data. For instance, Angradi et al. [44] downloaded photos from the photo-sharing sites Flickr, Instagram, and Panoramio to evaluate the ecosystem benefits of the Great Lakes areas. Other non-monetary methods, such as interviews and questionnaires, were extensively employed, with 42 and 33 studies making use of these methods, respectively. In addition, quantitative calculations were also prevalent, featured in 37 studies, which assessed CES through the utilization of metrics or indicators. For instance, Tarolli et al. [57] employed the quantity of nature recreation facilities as an indicator of recreational values. Moreover, there was notable interest in methods associated with participation and mapping techniques, such as participatory mapping (14 studies) and public-participation Geographic information systems (13 studies).

Additionally, this study identified five monetary methods, with “travel cost” being the most frequently employed, featured in 11 studies. A comprehensive list of methods and corresponding examples can be found in Table A1. Furthermore, it is worth noting that more than half of the studies relied on a single method, with only 50 studies incorporating multiple methods. The integration of different methods encompasses a combination of non-monetary methods, a combination of monetary methods, and a combination that incorporates both monetary and non-monetary methods. For instance, Orenstein et al. [58] employed a combined approach, integrating focus group discussions and scenario simulation methods utilizing an immersive visualization theater (IVT). This methodology aimed to investigate how individuals perceive and value the CES offered by the natural

landscapes within Israel's Carmel Forest National Park. In the IVT setting, 10 focus group discussions were facilitated, wherein a sequence of high-resolution photographs was projected. Participants were asked, both in written form and orally, to select the scenes where they would prefer to spend their time and subsequently provide explanations for their choices. For further information, please refer to the Supplementary Materials.

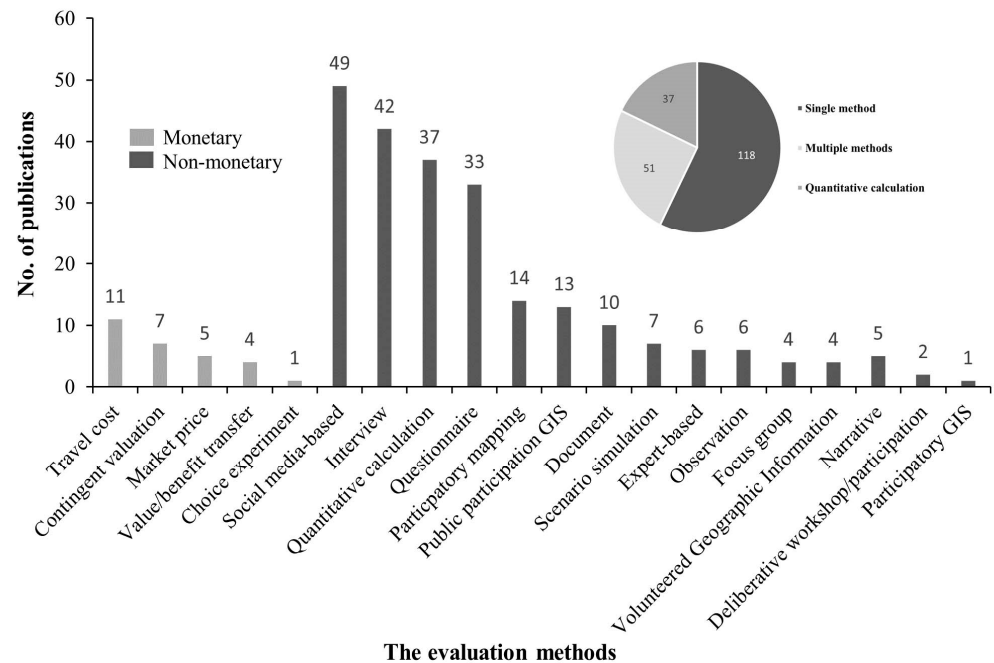


Figure 5. Evaluation methods of CES of studies.

Additionally, Figure 6 illustrates the distribution of evaluation methods for each year. The majority of studies utilized non-monetary methods, and their usage steadily increased in NP studies, with the exception of a significant decline in the year 2021. The use of interviews and questionnaires has consistently risen over time, while social-media-based methods have gained increasing attention and have recently ranked first in popularity.

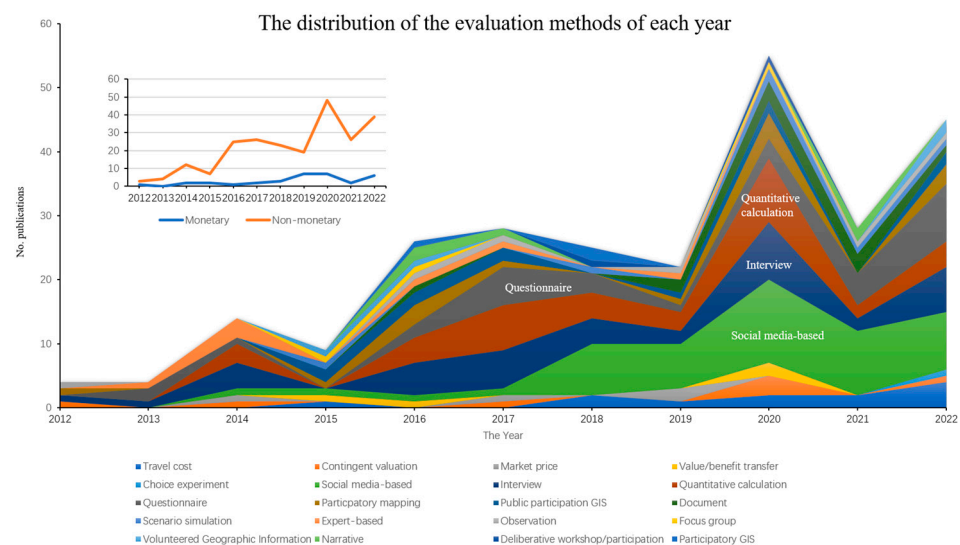


Figure 6. The change of the evaluation methods used from 2012 to 2022.

4. Discussion

In this section, we begin by examining the lessons and challenges gleaned from the existing research on CES within NP as indicated by the results. The discussion focuses on the geographical locations and the NP ecosystems under investigation, the categories of CES that have been assessed, and the methods employed in evaluation. Subsequently, this study offers recommendations for prospective research directions within the context of CES in NP.

4.1. Lessons and Challenges

4.1.1. Geographic Location and Habitats/Ecosystems

Knowledge about CES within NP is recent but has been rapidly increasing, particularly over the past decade, with the exception of a notable decline in 2021 due to the impact of the COVID-19 pandemic. Despite the concept's long-standing existence, empirical studies on CES assessment within NP were notably absent between 2005 and 2012. This absence may be attributed to the initial neglect and gradual development of CES assessment during that period. Furthermore, there exists a notable geographic disparity in knowledge, with the majority of studies concentrated in European countries and the USA. Research in developing countries, with the exceptions of China and Brazil, has been relatively limited. This geographical bias can be attributed to the early establishment of national parks and the extensive history of research in Europe and the USA. Additionally, this trend may be connected to the concept of CES having its roots in European and American countries. Furthermore, it is worth noting that this study did not review non-English language publications. This narrow linguistic scope may have contributed to the geographical bias.

Moreover, this study reveals that CES was examined in various national parks. The majority of these assessments treated national parks as a broad category and conducted a general evaluation of NP. However, evaluating a national park as a single entity poses a challenge, especially when it contains diverse ecosystems, potentially causing inaccuracies and uncertainties of the evaluation outcomes, consequently rendering them unsuitable for informing decision-making processes. In addition, forests and coasts were the most frequently assessed specific ecosystems. This may be due to the increasing popularity of nature-based tourism in recent years [59–63]. Research on other types is still limited. Cultural landscapes are barely mentioned in terms of this review study. Cultural landscapes encompass a wide range of CES, and the intricate interplay among these CES, as well as their connections to other ecosystem services, render their assessment more challenging. Maldonado et al. [14] also pointed out that coordinating the management of biodiversity conservation and CES such as agriculture on a regional scale involves multiple administrations, complicating the planning of these landscapes. Nonetheless, the introduction section has highlighted the importance of cultural landscapes within protected areas and national parks, as they play a pivotal role in delivering CES. These considerations amplify the complexities that future studies will encounter.

In addition, there is a scarcity of studies investigating the impact of NP features on the provision of CES. This knowledge is of paramount importance as it offers NP planners and managers the chance to preserve synergies and modify trade-offs by directing their attention toward NP features. It also assists stakeholders in more effectively addressing CES by facilitating the management and adjustment of these features. Designers, planners, and managers can use scenario-based modeling to anticipate changes in CES trade-offs or synergies resulting from various human interventions.

4.1.2. Assessed CES Categories

In national parks, all types of CES were examined, and the majority of studies chose MEA classification. This preference can be attributed to the MEA's distinction as the pioneering effort in categorizing ecosystem services, thereby establishing a robust foundation for the initiation of research and practical applications in the realm of ecosystem services [64]. However, it is notable that the use of MEA definition and classification may

lead to overlook some studies that are about CES in NP, which do not narrowly use CES and NP as their keywords.

In addition, in terms of the distribution of CES types, this study revealed that studies predominantly focus on recreation and ecotourism, as well as aesthetic values, which aligns with similar results found in other existing urban studies [65]. Other services gained less attention, such as sense of place and inspiration, which were occasionally omitted by researchers due to their perceived complexity in measurement, as exemplified in the study conducted by Ribeiro and Ribeiro [56]. In addition to the quantifiable services mentioned earlier, scholars emphasized the equal significance of all services. They stressed that stakeholders should bear in mind that advocating for the importance of CES in decision-making does not imply prioritizing one over another [66]. It is crucial to consider all services comprehensively to provide better support for NP practical applications.

Moreover, the challenge lies in the development of various classifications aimed at elucidating CES, which, in practice, prove intricate to articulate and investigate. The task of expressing abstract concepts such as “sense of place” or “knowledge system” in precise terms is notably arduous, frequently resulting in issues of incommensurability. Consequently, while classifications play a pivotal role in assisting scholars in identifying CES, there is a pressing need for future classification studies to place a heightened emphasis on comprehending the inherently intangible nature of CES.

4.1.3. CES Evaluation Methods

In NP studies, non-monetary methods, particularly interviews and questionnaires, were more frequently employed to assess CES. These methods emphasize the preferences and perceptions of people, possibly due to the fact that CES are seen as closely tied to human experiences. These findings are similar to those discovered in assessments of CES within studies focusing on urban green infrastructure [65]. In NP studies, researchers have innovated interview methods to closely connect people with nature, aiming to increase the accuracy of assessing outcomes, such as through “walking interviews”. For example, the study by Teff-Seker et al. [67] demonstrates how embodied interviews, carried out while walking in natural environments, capture real-time intuitive and grounded perceptions and reactions to four different ecosystem types and their associated services.

Developing methods that can comprehensively and accurately capture the CES, which highly rely on people’s perception and preference, is of paramount importance [68]. Such methods are crucial for strengthening the conceptual foundation of CES and supporting the evaluation, management, and decision-making processes related to NP and other protected areas. Participatory mapping methods have gained increased attention and usage in NP studies, variously called participatory mapping, PGIS, PPGIS, and VGI. These methods can be considered a valid approach to identifying CES, provided that the values identified are associated with locations that have a direct or indirect impact on human well-being [69]. Identifying the values and hotspots associated with locally perceived CES and establishing connections regarding access and benefit-sharing among planners/authorities, potential users, and local communities can facilitate the development of trust at the local level, enhance conservation effectiveness, and pave the way for innovative co-management arrangements.

However, conducting a comprehensive empirical stakeholder analysis can be time-consuming and resource-intensive. To address this limitation, social-media-based methods have garnered significant attention in NP studies, as shown in Figure 6, which is based on the social media data from various resources to assess CES. This change reveals that social media data are transforming environment science. With over half of the global population engaged in social media platforms, unprecedented amounts of user-generated data are revolutionizing the understanding of human interactions with the natural world. Social media encompass text, images, and accompanying metadata, which may include details such as the posting time or the geographic location of a photograph. Social media photographs from social platforms such as Facebook or Flickr have already proven useful,

for example, in obtaining information on visitor preferences or activities in national parks to indicate CES [70]. Analyzing social media data in the context of CES can be time-consuming and costly, particularly when relying on manual classification of images or text shared by people. Therefore, some researchers have explored the use of deep learning models, specifically convolutional neural networks, to identify elements related to CES in photos. For instance, Cardoso et al. [71] employed a deep learning model to automate the classification of natural and human elements relevant to CES from images on Flickr and Wikiloc. This method demonstrates significant potential for utilizing deep learning to automate the classification of human–nature interactions and elements in social media content, thereby aiding researchers and stakeholders in deciphering CES distributions, benefits, and values. However, the majority of studies focus on using social media to understand recreation values within parks, with less attention on those less addressed CES, as services such as sense of place and spiritual values cannot be explained solely by images. Methods should be combined to increase the accuracy of CES evaluation. Furthermore, it is essential to acknowledge that this emerging field faces challenges related to limited data access and ethical concerns about potential data misuse. The use of social-media-based methods plays a crucial role in understanding large-scale human–nature interactions. It allows for the observation of dynamics in social–ecological changes and the exploration of collaborative value construction associated with nature. However, challenges regarding data accessibility highlight the scientific community’s responsibility to strike a balance between research transparency and privacy protection while promoting inclusivity. This issue contributes significantly to the broader societal discussion concerning the use of social media data in sustainability science and for the greater good. Future studies should consider these aspects. Additionally, while a substantial portion of social-media-driven research supports broader conservation efforts and improved environmental management, it is important to recognize that the high spatial and temporal resolution of the data also poses risks of misuse and unintended consequences. Moreover, using social media to identify scenic or unique locations may lead to sudden increases in visitation, potentially causing environmental degradation and a diminished visitor experience at sites ill-prepared to handle such high levels of activity.

Other methods such as scenario simulation also have potential in assessing CES, as in the example given in Section 3.4, Orenstein et al. [58] used IVT to explore how humans use and value CES by choosing different scenes. However, a challenge that could arise is that the results of evaluations via monetary and non-monetary methods are not always consistent. Various methods should be assessed and compared to ensure the consistency of evaluation outcomes. In addition, an increasing number of studies are adopting multiple methods, with one method often complementing another as a supplementary approach. As shown in the results, 51 studies used more than one method. For example, Sinclair et al. [72] combined monetary and non-monetary methods to evaluate recreation by integrating the metadata of geotagged photographs from social media into single-site, individual travel cost models for 67 Italian protected areas. One method often complements another as a supplementary approach to enhance the evaluation outcomes. However, the challenge lies in improving evaluation efficiency.

4.2. Research Directions

NP play an increasingly important role in ecological conservation and sustainable uses of natural resources from both political and practical perspectives [73]. The awareness of the importance of CES in sustaining well-being and economic wealth has increased the significance of the CES evaluation in NP [74]. Given the challenges outlined above, this study delves into prospective avenues for future research in the field of CES within NP, offering recommendations in this section.

(1) Future studies should focus on broadening the scope of investigation in developing countries, and this study encourages more cross-regional and global studies. Additionally,

this study encourages more studies to be conducted in various NP ecosystems and habitats, such as cultural landscapes.

(2) Given that classifications play a crucial role in assessing CES, there is an urgent requirement for upcoming classification studies to prioritize the comprehension of the inherently abstract nature of CES, especially those less addressed services. Furthermore, it is worth noting that this study did not delve into the relationships among various CESs, including bundles, trade-offs, and synergies among CESs. The complex relationships between CES can lead to either positive or negative changes in the provision of various services in response to policy or environment change. This aspect represents a significant and challenging area that can enhance the accuracy of evaluation results. Additionally, it adds complexity to the practical application of CES. Comprehensive exploration of the trade-offs and synergies among different types of CES, particularly within NP, remains an area that requires further investigation. Furthermore, it is essential for NP planners and managers to understand the CES trade-offs influenced by their decisions because, in certain situations, a trade-off may be a deliberate choice, while in others, trade-offs may arise inadvertently.

In addition, the numerous positive and negative relationships among various services underscore the intricate nature of their interactions. For instance, studies by Turner et al. [75] highlighted a particularly noteworthy observation: cultural services exhibited positive correlations with one another and with regulating services, indicating synergistic or, at the very least, non-antagonistic relationships. In contrast, the agricultural provisioning services (ANIMALS and CROPS) generally displayed negative relationships with cultural and regulating services. Their studies demonstrated a pronounced inclination towards trade-offs between cultural and regulating services on one hand and provisioning services on the other, while also uncovering the potential for regulating and cultural services to foster synergistic relationships. The study of relationships between different ecosystem services is also a significant and challenging work. Exploring the relationships among various ecosystem services represents a not only significant but also challenging research endeavor. Therefore, it is advisable to consider exploring this as an independent research avenue in the future.

(3) It is imperative to foster the development of additional methods and to explore their application further, aiming to enhance the evaluation of CES and thus to bolster the accuracy of outcomes within the NP context. This study highlights the participatory mapping-related methods and social-media-based methods to offer valuable insights into CES evaluation. On one hand, methods such as participatory mapping and social-media-based approaches prove valuable in NP management by identifying key areas. However, it is crucial to note that using social media to pinpoint scenic or unique locations can result in sudden spikes in visitation, causing environmental stress and a reduced visitor experience at sites unprepared for such high levels of traffic. To address these concerns, researchers should exercise discretion and avoid sharing precise coordinates of rare discoveries, such as endangered locations, exceptional natural and cultural attractions, and fragile ecosystems. In addition, it is important to acknowledge that neither method, when used in isolation, is flawless. Therefore, this study highly encourages the integration of these methods with other methods or techniques to achieve a more comprehensive evaluation. New techniques such as machine learning or deep learning can be incorporated with social media methods to enhance the efficiency of the evaluation processes through the analysis of extensive data collected from social media platforms. Methods should undergo testing to confirm the applicability of the data and assess the replicability of the techniques. Diverse methods should be tested to ensure the high consistency of results, and it is an interesting topic for future research to study evaluation results based on different methods.

(4) This study encourages further research on integrating CES evaluation into the ecosystem services framework to support the practice of CES assessment in national parks. As future work, it would be beneficial to investigate the supply and demand dynamics of CES in order to explore potential trade-offs or synergies among various end-users,

including tourists and local communities, and to assess their impact on CES delivery. Additionally, forthcoming studies should emphasize the significance of cultural landscapes and landscape features associated with CES, thus advocating for the conservation and sustainable management of national parks.

5. Conclusions

Elaborating on the cultural benefits that humans derive from national parks through a CES assessment is an emerging and crucial field that connects human well-being to NP. Converting these benefits into actionable concepts for environmental decision-makers and managers is a challenging yet vital task in supporting NP practices. To achieve this goal, this study conducted a literature review of existing empirical studies to map the entire knowledge landscape of CES evaluation in NP.

This study revealed an imbalance in the worldwide distribution of research efforts, with a predominant focus on Europe and the USA, leaving a dearth of knowledge regarding CES in developing nations. Furthermore, studies dedicated to CES within distinct NP habitats or ecosystems are scant, and not all services have received commensurate attention. Researchers have employed various evaluation methodologies to assess CES, predominantly favoring non-monetary approaches. Among these methods, participatory mapping-related and social-media-based approaches enjoy widespread popularity among researchers.

In conclusion, this study recommends that further research explore a broader spectrum of NP habitats and ecosystems globally, with more focus on developing countries. The development and testing of additional evaluation methods within the NP context are crucial, with consideration for all services, especially those that are less explored, such as the sense of place. Furthermore, studying the interactions among various CES is essential for gaining a deeper understanding and improving the accuracy of evaluation results, including trade-offs and synergies among different CES. Moreover, emphasizing the combination of various methods to enhance evaluation accuracy and encouraging the exploration of additional techniques to support the evaluation methods are also vital. Additionally, it is essential to investigate how NP features impact the delivery of CES to enhance NP management practices, with a specific focus on understanding the influence of cultural landscape features on CES. Finally, future studies should integrate CES evaluation into the ecosystem services framework to facilitate its application in NP conservation and management.

Although the literature search and selection process aimed to minimize bias and enhance objectivity by employing inclusion and exclusion criteria, the author acknowledges that the review may still have limitations due to the inherent subjectivity involved in making judgment calls when determining which publications to include or exclude. While this review may not encompass every potentially relevant publication, the author has confidence that it offers an accurate portrayal of the current state of CES research within NP.

Supplementary Materials: The following supporting information can be downloaded at: <https://www.mdpi.com/article/10.3390/land12101912/s1>, Table S1: The list of the selected papers and the key information of each paper.

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Appendix A

Appendix A includes a table presenting a list of methods along with corresponding examples.

Table A1. Summary of the evaluation methods and corresponding examples.

Method	Description of Method	Example
Market price	Estimates the market price of products related to CES in NP.	Tanner et al. [76] estimated the contribution of mangrove-based tourism to indicate CES in Galapagos National Park.
Travel cost	Estimates the travel cost to a NP.	Mayer and Woltering [77] employed zonal travel cost models (TCM) to estimate the recreational ecosystem services of 15 German national parks.
Contingent valuation	Asks people about their willingness to pay for a CES provided by a NP.	Gómez-Valenzuela et al. [78] assessed the significance of CES in the restoration and conservation efforts of Loma Miranda by using willingness to pay.
Value/benefit transfer	Estimates economic values by transferring existing benefits to CES evaluation.	In studies by Brown et al. [79], alternative value transfer methods were demonstrated. These methods involved using recreation value to compare actual distributions with predicted distributions, utilizing land cover indices derived from value proportions, and deviations from the expected distribution.
Choice experiment	Asks people to make choices to indicate their preferences for different CES provided by NP.	Mameno et al. [11] conducted a choice experiment survey using digitally manipulated images based on climate change scenarios and natural scientific knowledge to indicate the perceived aesthetic benefits from mountainous national park in Japan.
Observation	Observes people's actions and behavior in NP to assess CES.	Breyne et al. [80] observed a certain mismatch between societal values, preferences, and actual forest management.
Document	Looks and analyzes texts, images, or other kinds of materials to develop knowledge about human CES preferences in NP.	Kim et al. [81] used the mobile phone information to evaluate tourism in national parks.
Social-media-based	Uses social media data from various resources, such as Google, Panoramio, Flickr, Instagram, etc., to assess CES related to NP.	Zhang et al. [82] measure and map visitation to public lands in Utah by using social media platform Panoramio and the Flickr platform.
Interview	Directly asks interviewees about the value of CES of NP to gain a deeper understanding of it.	Livingstone et al. [83] asked people to assign importance values to CES by conducting in-person interviews.
Questionnaire	Consists of a series of questions to gather information about CES in NP from respondents.	Bachi et al. [84] used a photo-questionnaire for assessing CES in NP in Brazil.

Table A1. Cont.

Focus group	Encourages different stakeholders to obtain more information and discuss the topic of CES to arrive at a carefully considered conclusion.	Dou et al. [65] analyzed CES by combining 250 semi-structured interviews and 26 local stakeholders in a focus group discussion.
Expert-based	Emphasizes the professional knowledge of experts from various disciplines in assessing CES in NP.	Maldonado et al. [14] assessed CES according to the consulted experts, the agricultural ecosystem service is provided by herbaceous crops, woody crops, greenhouses, and heterogeneous lands.
Participatory mapping	Invites people to participate in creating map to represent their spatial knowledge of CES in NP.	Martin et al. [85] mapped CES on the basis of community participation.
Participatory GIS (PGIS)	Combines peoples' spatial knowledge with geographic information systems (GIS).	Davis et al. [86] asked participants to mark the natural place they find most attractive through an online participatory GIS survey (PGIS).
Public participation GIS (PPGIS)	Highlights the local and public knowledge generated by local and non-governmental groups.	Brown and Hausner [61] applied PPGIS to identify the type and intensity of CES located in coastal areas in the U.S., Australia, New Zealand, Norway, and Malaysia.
Scenario simulation	Simulates scenarios by displaying different CES capacities in the same NP to provide advice supporting policy-making and planning.	Sandhu et al. [44] developed four plausible scenarios with different CES to the year 2050 that address issues in the northern Adelaide coastline, South Australia.
Quantitative calculation (including evaluation models)	Calculates benefits based on indicators or tools, such as GIS-based tools and other models or frameworks.	Funk et al. [87] chose the ARIES platform to quantify recreational values.
Narrative	Elicits stories or describes scenes from respondents to obtain information on CES. Analyzes the information narrated by people to determine their sense of place.	Dick et al. [88] assessed cultural ecosystem services (CES) through a summary of the narratives describing the principal changes for each site between 1993 and 2012.
Volunteered Geographic Information (VGI)	VGI is the use of digital tools to collect, analyze, and share geographic information that was provided by individuals which can be used to assess CESs.	Upton et al. [34] described the development of a map of forest recreational resources in Ireland by combining conventional forest cover data with VGI of recreational trails.
Deliberative workshop/participation	Provides a means for constructive engagement by allowing people to discuss, exchange, and construct values or preferences by engaging in a sustained process of co-learning, both from one another and with the input of objective information by the research team.	Roux et al. [89] followed a deliberative and participatory approach to exploring and making sense of the experiences and perceptions of people in order to develop a deeper understanding of the CES provided by National Parks.

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