Review

An Analysis of the Worldwide Research on the Socio-Cultural Valuation of Forest Ecosystem Services

Juan F. Velasco-Muñoz *[ID], José A. Aznar-Sánchez [ID], Marina Schoenemann and Belén López-Felices [ID]

Research Centre on Mediterranean Intensive Agrosystems and Agrifood Biotechnology (CIAIMBITAL), Department of Economy and Business, University of Almería, 04120 Almería, Spain; jaznar@ual.es (J.A.A.-S.); ms665@inlumine.ual.es (M.S.); blopezfelices@ual.es (B.L.-F.)
* Correspondence: jfvelasco@ual.es

Abstract: The socio-cultural valuation of forest ecosystem services is a useful tool to generate knowledge and help balance the different interests of stakeholders with respect to the management of these services. The aim of this study is to analyse the evolution of global research on the economic valuation of forest ecosystem services through a review of the existing literature on this topic. The results show that socio-cultural valuation has gained importance in recent years. There is a wide disparity between the countries conducting the research and those being studied. Inconsistency has been observed in the definition and classification of services provided by forests, as well as a lack of unanimity on the reference framework to be applied. The main methodological approaches in the socio-cultural valuation of forest services are participatory mapping, social media analysis, the Q method and free listing. For the collection of primary information, the dominant methodologies are focus groups, semi-structured interviews and online surveys. Finally, this study demonstrates that socio-cultural valuation has great potential to improve the legitimacy of forest ecosystem management decisions and to promote consensus building.

1. Introduction

Ecosystem services (ES) represent the series of benefits obtained by society from ecosystems, through the transformation of natural resources into goods and services that have value for people and contribute to their well-being [1,2]. There is a wide variety of these services, if we take into account that they are both tangible and intangible in nature and that we benefit from them directly or indirectly [3]. With regard to the forest ecosystems, their capacity to fight against climate change particularly stands out [4,5]. This is because the trees purify the air and have the capacity to store carbon. These constitute two of the most important services currently provided by forest ecosystems, which is why they are considered the lungs of the planet [6,7]. On the other hand, the forests also provide an abundance of wild foods, such as mushrooms, honey and red fruits [8], and raw materials, such as wood, resins, fibres, etc. [9]. Furthermore, forests offer people the possibility of enjoying a wide range of leisure, recreational and spiritual experiences [10].

However, there is a series of threats to the conservation of the ecosystems that provide these services. The principal cause of the disappearance of the forests on a global scale is the change in the use of the land, particularly to convert it into farmland [11]. Deforestation is advancing at a pace of 13 million hectares per year and is responsible for between 12% and 20% of the gas emissions that produce the greenhouse effect and contribute to global warming [12]. Other factors that are driving the degradation and disappearance of the forest ecosystems are the growth in the population, urban expansion and over-exploitation as a result of economic development [13,14]. On the other hand, the global climate is generating

long-term droughts and imbalances in the water supply, desertification, a reduction in the carbon sequestration capacity, erosion and a loss of fertility of soil, and an increase in the frequency and intensity of fires [15,16]. The forests house 80% of the biodiversity of the earth's land surface area, with more than 60,000 species of trees alone [2,17]. All of this can generate a wide range of impacts on a large scale for the ecosystems and their biodiversity, which can be difficult and costly to repair [18,19]. This deterioration of the biodiversity of the ecosystems also has a strong impact on their resilience or buffering capacity with respect to adverse phenomena [20]. Moreover, 1.2 billion people only in tropical countries (30% of the population) depend directly on the forests for their food, clothes, energy and income [21]. Therefore, the degradation and loss of the forests means the loss of livelihood for a large part of the population, particularly the poorer and more vulnerable populations of the low-income regions, and a loss of human well-being due to the reduction in ES flows for the global population as a whole [13,22].

The field of study of ES began to be developed at the end of the twentieth century. Since then, initiatives such as the Millennium Ecosystems Assessment [5] and the Economics of Ecosystems and Biodiversity [23] have contributed to introducing the concept of ES into the political sphere [24,25]. The management of ecosystems involves the balancing of a broad series of conflicting interests, which often implies rivalry in the provision of services in terms of trade-offs [26,27]. Therefore, when managing the natural environment, the assessment of the ES is a tool able to provide useful knowledge for formulating policies and defining strategies based on the knowledge of the ecosystems and the stakeholders involved [28,29]. The scientific literature justifies the valuation of ES in the field of ecosystem management based on the absence of markets of reference to assess a large part of the goods and services provided by the forests [30]. Other arguments include the under-estimation that is usually made of the non-material ES and their contribution to promoting sustainable economic development and the uncertainty with respect to their future supply and demand [31]. According to the 2021 report of the United Nations on The Global Forest Goals, 18% of the forests have some kind of protected status [32]. However, many studies highlight the existence of imbalances between the current forest management strategies and the preferences of the general public [33].

In light of all of this, we can identify a need for information on the wide variety of stakeholders when designing management policies and strategies for natural ecosystems. Greater knowledge is required on the profiles of the different stakeholders and the diversity of the decisions to be taken in order to ensure consensus on the management processes [34]. Socio-cultural valuation of ES is the tool able to provide information of common use, which is easy to interpret and transmit [2]. This valuation can be of use to the competent authorities for assessing conservation methods and assigning budgets in order to optimise the management of the scarce resources to achieve the economic, environmental and social objectives [35,36]. The objective of this study is to examine the evolution of the research on a global scale on the socio-cultural valuation of forest ecosystem services through a review of the existing literature on this topic. First, the analysis will focus on the general parameters of the results obtained in this field, such as the number of publications, the principal authors and the leading countries in the research field. Second, the principal characteristics of the research will be examined, such as the services evaluated, the categories, the areas of study and the methodologies applied. Finally, we will attempt to identify whether there is a relationship between the type of protection status of the forests and the socio-cultural valuation of ES.

2. Methodology

2.1. The Bibliometric Method

In order to respond to the proposed objective, bibliometric analysis has been selected, given that it is a statistical method capable of identifying, organising and analysing the main components of a specific field of research [2,11]. This methodology was developed by Garfield in the mid-20th century and is currently a fundamental tool for synthesising

the large amount of information available [37]. Research in areas of knowledge such as economics, biology, energy, engineering, medicine and management, psychology, etc., are analysed using this methodology. Bibliometrics allows researchers to evaluate the contribution of the different agents involved in the research process, such as authors, institutions, or countries. Furthermore, bibliometric analysis allows the relevance of scientific production to be assessed [38], as well as to identify the main drivers of a research field. The results of the bibliometric analysis of scientific literature are useful for different user profiles. In the case of experts, bibliometric results can be useful when evaluating scientific production on a specific topic. In this way, it is possible to easily identify what has already been studied and to determine opportunities for future lines of research [39]. For those interested in getting started in a field of study, the bibliometric review provides a starting point from which to identify existing lines of work, key findings and research gaps [40].

The bibliometric study can be based on different approaches, including co-occurrence analysis, co-citation analysis and bibliographic coupling analysis. The most frequent data objects of study are the year of publication, which allows evaluating the production within the research field; citations, which serve as an indicator of the quality of the publication; the thematic categories, which distinguish the disciplinary approach of the developed studies; and the keywords, which are used for the analysis and mapping of the information in the review works [41]. In addition, three types of indicators can be used in bibliometric studies [42]: (i) quantity indicators, which refer to productivity; (ii) quality indicators, which measure the impact of investigations; and (iii) the structural indicators, which evaluate the connections established between the different elements that intervene in the research process.

2.2. Data and Processing

The Scopus database was selected for this study. This decision was adopted based on the fact that this database is considered the largest data repository, being the most used in terms of abstracts and citations of peer-reviewed literature [38,39]. Second, this database provides greater accessibility [40,43]. Furthermore, it enables a more complete series of search, processing and downloading options of the complete data, unlike Web of Science (which only enables the downloading of the information contained in Core Collection) [44,45]. The parameters used for the search and selection of the sample of papers to be analysed include the concepts of the forest, ecosystem service and socio-cultural valuation, as shown in Figure 1 [46]. All terms including the root forest have been used for the forest concept (forest, forests, forestry, foresting, forested) and silvicultur (silviculture, silvicultural, silviculturally). The terms ecosystem service, environmental service, and ecological service have been used for the ecosystem service concept. For the concept of socio-cultural assessment, socio-cultural, social preference, qualitative method, qualitative research, cultural value, cultural valuation, social perception, socio-cultural valuation, socio-cultural assess, social valuation, social perception, social assess, cultural valuation, cultural assess, and stakeholders have been included. The complete search is available as Supplementary Materials (Supplementary Material S1). The search was carried out in January 2022.

The initial result was 294 documents. These studies were reviewed one by one in order to confirm that they were consistent with the objective of this study. The criterion for the selection of the works was that the study should aim to carry out a socio-cultural valuation of the services provided by forestry systems. For this paper, following the Millennium Ecosystem Assessment (MEA) [5], forest is understood as the type of land cover characterised by trees and shrubs. This includes land with a canopy cover (or equivalent stocking level) of 5–10% of trees capable of reaching a height of 5 m at maturity, a canopy cover of more than 10% of trees that cannot reach a height of 5 m at maturity (such as dwarf or stunted trees), or a shrub and bush cover of more than 10% [47]. Plantations have also been considered in this work. MEA [5] defines plantations as "forests established by planting and/or seeding in the afforestation or reforestation process, and consisting

of introduced species or, in some cases, indigenous species". Finally, what MEA [5] calls "trees outside forests" have also been included in this work, provided that their provision of services has been assessed in the same terms as if they were forests. Following Walz et al. [48], socio-cultural valuation is considered to be the process of identifying values that describe the principles, importance or preferences expressed by people towards nature, with the particular benefits obtained by humans. Among the methods used to value ecosystem services from a socio-cultural perspective, a wide variety can be found. Some examples are participatory mapping, free listing, or the Delphi method. There is debate about the validity of monetary methods for capturing socio-cultural values [49]. Monetary methods that expose people's preferences and perceptions based on stated and revealed preferences are also used to reveal anthropocentric values [50]. However, market-based economic approaches are considered to be less able to represent socio-cultural values due to their limitation to markets and exchange values [48]. Therefore, this paper will not include such methodologies. As a result, the final sample of studies was composed of 157 documents. Subsequently, the most salient general information of the publications was analysed. The variables studied were the year of publication of the articles, journals, countries and authors. Next, a qualitative systematic review was conducted to analyse the ecosystem services object of the study, the services categories, the country of the area of study, the methodology used for the valuation and the designation of protected areas. The full list of reviewed papers is available as Supplementary Materials (Supplementary Material S2).
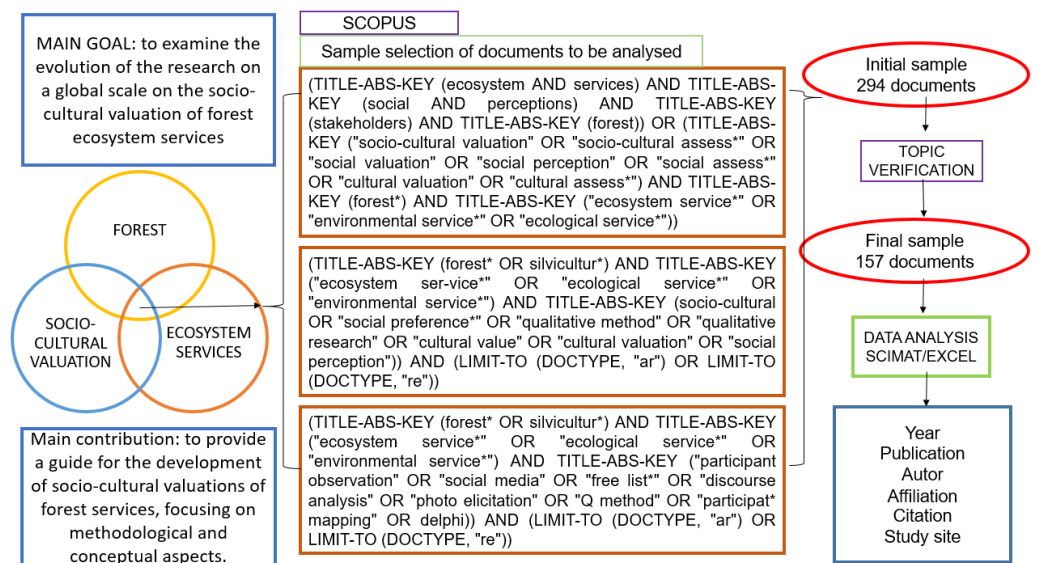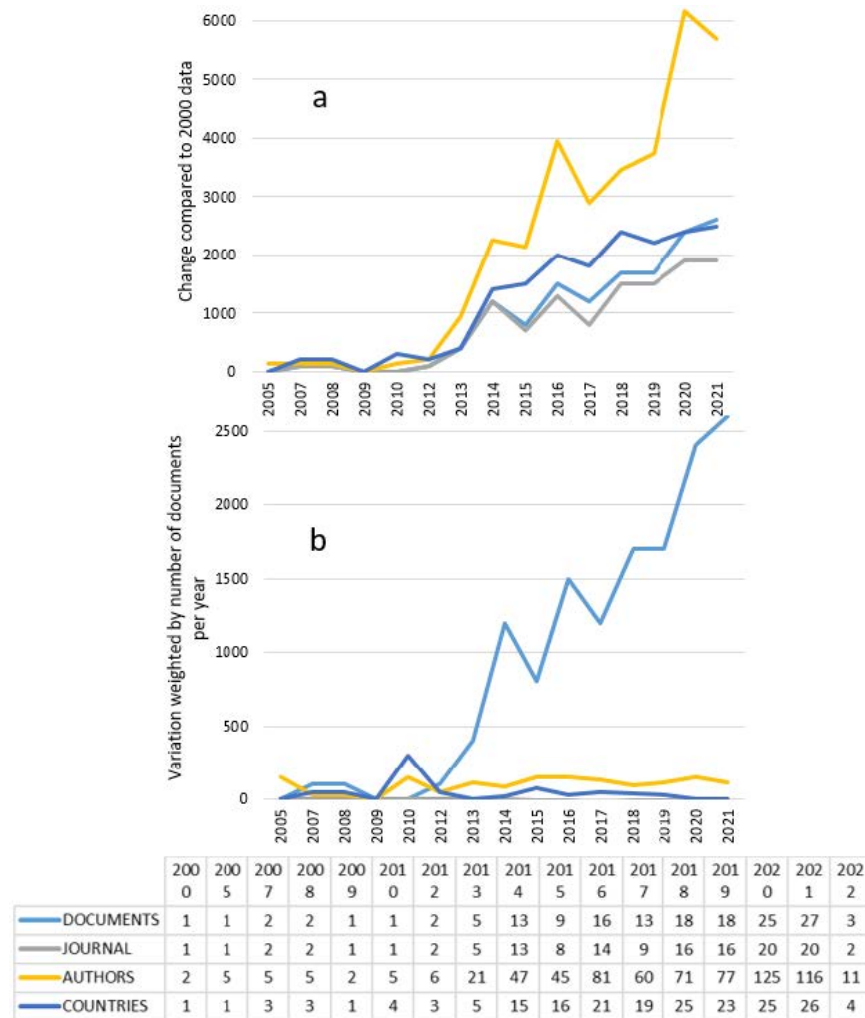

Figure 1. Methodological development of the present study.

3. General Context of the Research on the Socio-Cultural Valuation of the Ecosystem Services Provided by Forests

In order to contextualise the research on the socio-cultural valuation of ecosystem services provided by forests, a summary of the data contained in the database used has been made. First, it should be noted that 100% of the documents making up the final sample are articles. Figure 2 shows the evolution of the principal variables related to the publication of the topic object of study, including the number of documents per year, the number of journals in which they are published, the total number of authors and the number of countries of affiliation of the authors. The top graph (Figure 2a) shows the index of variation of the different variables, taking as a base the data for 2000. The lower graph (Figure 2b) shows the evolution of the same variables but weighted by the number of annual publications. The table in the lower part of the figure shows the absolute values of each variable. The years without publications have been left out.

	200 0	200 5	200 7	200 8	200 9	201 0	201 2	201 3	201 4	201 5	201 6	201 7	201 8	201 9	202 0	202 1	202 2
DOCUMENTS	1	1	2	2	1	1	2	5	13	9	16	13	18	18	25	27	3
JOURNAL	1	1	2	2	1	1	2	5	13	8	14	9	16	16	20	20	2
AUTHORS	2	5	5	5	2	5	6	21	47	45	81	60	71	77	125	116	11
COUNTRIES	1	1	3	3	1	4	3	5	15	16	21	19	25	23	25	26	4

Figure 2. Trends of general variables in research on socio-cultural valuation of forest ecosystem services. (**a**) index of variation base 2000; (**b**) index of variation base 2000 weighted by the number of annual publications.

In terms of publication date, the oldest document was published in 2000. Since then, the evolution of the number of studies on this topic has been irregular. Another paper was published in 2005. In the period 2007–2010, between one and two articles are published annually. From 2012 onwards, we find a turning point, starting a growth trend that continues to the present day. Thus, publications in the last three full years of the period analysed (2019–2021) represent 45.5% of the total sample. These data show that socio-cultural valuation has gained relevance in recent years. The 157 studies that make up the sample have been published in a total of 77 journals. The journal with the most studies published is *Ecosystem Services* with a total of 19. It is followed by *Forests* with 9; *Ecological Indicators* with 6; and *Applied Geography, Ecology and Society*, as well as *Human Ecology*, with 5. On the other hand, the average number of authors per article is 3.9, with the minimum number of authors per publication being one and the maximum 15. The total sample of articles includes a total of 632 authors, affiliated to 69 different countries. The top authors in terms of number of papers are Tobias Plieninger of the University of Kassel (Germany) with six papers, Greg G. Brown of the Formerly California Polytechnic State University (USA) with five, and Himlal Baral of the Center for International Forestry Research (Indonesia), Aida Cuní-Sánchez, affiliated with the University of York (UK), and Alessandro Paletto, affiliated with the Forestry and Timber Research Centre of Italy, with four papers.

Table 1 shows a list of countries involved in the socio-cultural valuation of forest ecosystem services. In addition to the name of the country, the number of papers in which authors affiliated with that country has participated and the number of times each country has been the subject of a study in an article are included. As we can see, the countries whose authors have carried out the greatest number of studies are the USA with a total of 26, the UK with 21, Spain with 18, Australia and Germany with 14, Italy with 11, and France with 10. However, the countries that have been the subject of the study the most are the USA with a total of 13, Spain with 10, China with 8, and Germany and Poland with 7. The most notable cases, in terms of the difference between studies carried out within the country and those carried out by affiliated researchers, are the USA, UK, Australia and Denmark. This is due to several factors. On the one hand, these countries include the most prestigious research centres with the greatest research capacity. Therefore, these centres are a point of attraction for foreign researchers, who become affiliated with these centres. On the other hand, these centres are the ones that carry out the greatest amount of collaborative work with centres in other countries. For example, researchers affiliated with centres in Denmark are involved in case study work in Cameroon [51], the Democratic Republic of Congo [52], or Spain [53].

Table 1. Countries related to research on socio-cultural valuation of forest ecosystem services.

Countries	Documents	Study Sites	Countries	Documents	Study Sites
USA	26	13	Nepal	1	5
UK	21	6	Viet Nam	1	3
Spain	18	10	Cameroon	1	2
Germany	14	7	Suriname	1	2
Australia	14	2	Zimbabwe	1	2
Italy	11	6	Bhutan	1	1
France	10	5	Burundi	1	1
Denmark	9	0	Costa Rica	1	1
China	7	8	Democratic Republic Congo	1	1
Poland	6	7	French Guiana	1	1
Brazil	6	6	Gambia	1	1
Mexico	6	5	Ghana	1	1
South Korea	6	5	Jordan	1	1
Sweden	6	5	Liberia	1	1
Finland	6	3	Malaysia	1	1
Indonesia	6	2	Myanmar	1	1
Netherlands	5	2	Nigeria	1	1
South Africa	5	2	Pakistan	1	1
Canada	5	1	Philippines	1	1
Colombia	4	5	Romania	1	1
Chile	4	3	Singapore	1	1
Belgium	4	2	Taiwan	1	1
Austria	3	3	Venezuela	1	1
Slovakia	3	3	Congo	1	0
Benin	3	2	Cote d'Ivoire	1	0
Czech Republic	3	2	Guinea	1	0
Norway	3	2	Lithuania	1	0
Portugal	3	2	Papua New Guinea	1	0
Japan	3	1	Trinidad and Tobago	1	0
Ecuador	2	4	Albania	0	2
Kenya	2	4	Ethiopia	0	2
India	2	3	Kosovo	0	2
Argentina	2	2	Serbia	0	2
Israel	2	2	Bulgaria	0	1

Table 1. *Cont.*

Countries	Documents	Study Sites	Countries	Documents	Study Sites
Slovenia	2	2	Cyprus	0	1
Ukraine	2	2	Greece	0	1
Hungary	2	1	Malawi	0	1
New Zealand	2	1	Nicaragua	0	1
Turkey	2	1	Peru	0	1
Switzerland	2	0	Senegal	0	1

4. Ecosystem Functions, Ecosystem Services and Classification Frameworks

When analysing the relationship between ecosystems and human well-being, Martín-López and Montes [54] define ecosystems as natural capital with ecological integrity that has the aptitude to cope with disturbance and the capacity to generate a flow of services to humans by maintaining its functions. The flow of ecosystem services is derived from the ecosystem carrying out these functions. Continuing with this anthropogenic perspective, these functions of ecosystems can be defined through their capacity to provide services that contribute to human well-being. De Groot et al. [55] classify the functions of the ecosystems as regulation, substrate, production and information. The regulating functions include the essential ecological processes. The substrate functions refer to the provision of spatial conditions for the maintenance of the biodiversity. The production functions allude to the capacity to generate biomass which can be used as food, fabric, etc. In addition to this, finally, the information functions refer to the contributions of the ecosystems through knowledge, experience and the cultural relations with nature [56].

Therefore, the ecosystem services could be defined as the benefits that the different functions provide to human beings [57]. The substantial difference between the forest functions and the ecosystem services resides in the fact that the functions imply the capacity of the ecosystem to supply goods and services to society, while the service alludes to the benefits that people obtain from the ecosystems [58]. Currently, the most accepted definition of ecosystem services is that provided by MEA [5], as the direct and indirect contributions of the ecosystems to human well-being. However, as indicated by Breyne et al. [33], the understanding of benefit for human beings depends on the perception of each person at a given time and the value that he or she attributes to it. These authors coincide with the updated definition of Harrington et al. [59], which refers to ecosystem services as "the benefits that humans recognize as obtained from ecosystems that support, directly or indirectly, their survival and quality of life".

Over the last few decades, there have been different global initiatives that have sought to develop the conceptual framework of ecosystem services [31]. One of the principal challenges has been the establishment of a classification for general usage of the wide variety of services. MEA [5] categorises services as (i) provisioning services (the products obtained from the ecosystems); (ii) regulating services (the benefits derived from the regulation produced by the ecosystems processes); (iii) cultural services (the intangible benefits that are obtained from the ecosystems through spiritual enrichment, cognitive development, reflection, recreation and aesthetic experiences); and (iv) supporting services (all those functions providing support to enable the provision of the rest of the categories). The European Union developed the initiative known as The Economics of Ecosystems and Biodiversity (TEEB) [23], particularly aimed at the economic valuation of the services for their inclusion in political decisions. The TEEB classifies the ecosystem services into four groups: provisioning, regulating, habitat and cultural services. In 2009, the European Environment Agency proposed the Common International Classification of Ecosystem Services (CICES) [60]. This classification distinguishes between only three services categories: provisioning, regulating, and maintenance and cultural services. The CICES has a hierarchical structure, which enables the optimum level of detail to be selected for its ad hoc application, as each service is organised into divisions, groups and classes [61].

5. Types of Value

The ecosystems and their services are made up of different types of value [57]. The concept of the value of ecosystem services can be defined as the criterion used to justify the decisions and behaviours with respect to the selection and management of the services and the ecosystems [62]. People, on both an individual and group level, are the agents responsible for bestowing value to the services provided by the ecosystems. This is because societies as a whole share cultural and social values that can be considered shared principles and virtues and a shared sense of what has value and what makes sense [63]. From an economic perspective, Velasco-Muñoz and Aznar-Sánchez [57] describe these values as (i) "Use Value", which related to the contributions received from the ecosystems, and (ii) "Non-use Value", which is related to moral or ethical considerations of the conservation of the ecosystems and the services that they provide (Figure 3). In turn, the use value includes (i) the direct use value (the result of the direct use and enjoyment of ecosystems, either through in situ experiences or through the extraction of what they produce), (ii) the indirect use value (not reflected in conventional markets and referring to the ecological processes and regulating services of the ecosystems), and (iii) option value (referring to the sustaining of the flow of services for the future). Meanwhile, the non-use values include (i) the existence value (related to the satisfaction of conserving the ecosystems, irrespective of its enjoyment or use), (ii) the bequest value (satisfaction of conserving the ecosystems for future generations), and (iii) the altruist value (satisfaction of enabling other people to access the ecosystems and their services).
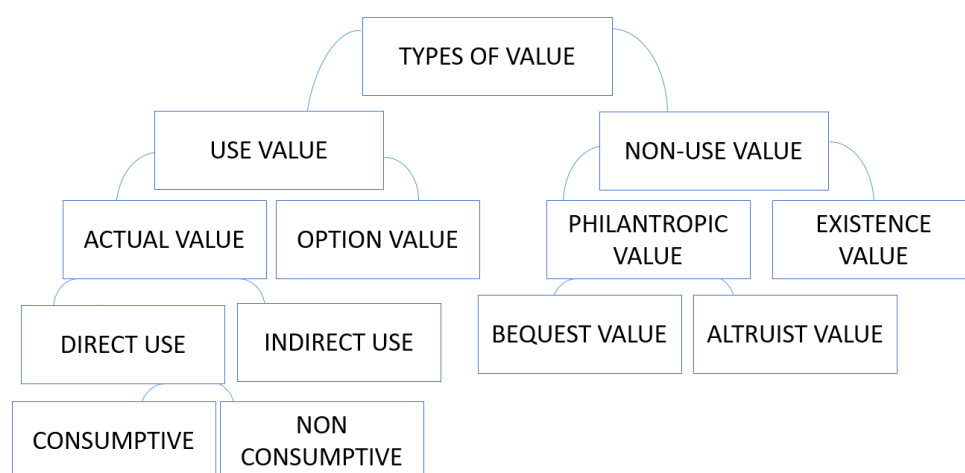
Figure 3. Types of value. Adapted with permission from ref. [57]. Copyright 2017 Juan Francisco Velasco Muñoz, José Ángel Aznar Sánchez.

On the other hand, Kenter et al. [63,64] define a different group of values. These authors identify three principal concepts of value: (i) transcendental values (broadest central values including ethical principles or desired final states); (ii) contextual values (the value or importance of something); and (iii) the indicators of quantitative or qualitative value (the result of some form of valuation). According to Breyne et al. [33], transcendental values influence contextual values, which, in turn, influence the choice of specific value indicators. For Ciftcioglu [61], social value refers to the shared social perspectives, the values and narratives obtained through social interactions, open dialogue and social learning.

6. Socio-Cultural Valuation of Ecosystem Services

The valuation of ecosystem services can be contemplated, on the one hand, as the capacity of the ecosystem to provide services, that is, from the supply side. On the other hand, it can be regarded as the amount of environmental goods and services that society desires, that is, from the demand side [2]. This highlights that the state of an environmental service is not only influenced by the properties of the ecosystem, but also by social

needs [59]. According to this duality, we can differentiate between approaches aimed at measuring biophysical units of service provision as a result of carrying out ecosystem functions (methods of biophysical valuation), from the perspective of supply [54]. On the contrary, we can also find demand-based approaches which have two different perspectives. First, economic valuation approaches conduct the quantification in monetary units of the goods and services provided by the ecosystem [43]. Second, the socio-cultural valuation approaches contemplate the perception of people regarding how the different services contribute to their well-being [2], that is, how this service or its associated benefits matter (in non-monetary terms) to somebody or to a group of people [33]. According to Ciftcioglu [61], the methods of social valuation explore the importance, preferences, needs or demands expressed by people towards nature.

Breyne et al. [33] distinguish between value indicators of ecosystem services, used to describe the performance of a service and the opinions about the importance of this service. With respect to socio-cultural valuation, in the first group we can find a series of objective indicators as opposed to the subjective indicators of importance. The first, social value indicators, refers to objectively measurable and comparable data that are homogeneous for everyone, such as the number of job positions. The subjective indicators of socio-cultural value are those that depend on the criteria, value and ideals of people and are difficult to compare. They are different for each individual and fundamentally depend on the context at any given moment. Social values cannot be captured by the economic or ecological valuation techniques [61]. However, in their study of the socio-cultural value provided by the trees in the agricultural landscapes of Costa Rica by the farmers, Leary et al. [65], in contrast with the previous contemplation, defend that socio-cultural valuation reveals both the monetary and non-monetary benefits of a landscape or a landscape component.

7. Factors Influencing Socio-Cultural Valuation of Forest Ecosystem Services

As has already been shown in previous studies, assessments of ecosystem services should move towards a socio-cultural approach (including the participation of different stakeholders), i.e., incorporating intangible aspects such as social preferences into the valuation of these services [66]. Under this premise, there are different factors that can condition the valuation of ecosystem services in forests, giving rise to contrasting preferences and a multidimensional relationship between people and the ecosystem [67] which, broadly speaking, can be grouped into the following factors.

Initially, we should talk about the context of the place, which leads to attitudes of belonging [68], which differ between residents/landowners and tourists/urban visitors [69], which in turn will depend on where and how they live, the uses of the land and knowledge of the historical processes of the place [70]. On the other hand, there is the socio-cultural sphere and the factors specific to each person, such as attitudes and values (cultural, social and human) [36,67], as well as individual experiences and situations [70]. Finally, the socio-economic context, knowledge and environmental sensitivity of the people involved in the valuation should also be highlighted, which may condition the perceived importance of ecosystem services in forests [58]. Not forgetting the differential factor that the socio-demographic characterisation of the group of participants may have on their own appraisals, i.e. geographical origin, gender and occupation [69,71].

Finally, from a procedural point of view, whenever an ES valuation is considered, special attention should be paid to the lack of standard methods for obtaining stakeholder perceptions, as pointed out by Asah and Blahna [72], on the one hand, and the establishment of a set of common ES and social valuation metrics, on the other. In other words, given the plurality that exists today, as argued by Marcos et al. [73] for the specific case of marine ecosystems, there is a lack of a preset conceptualisation for each ES and its social benefits, which also makes it difficult to quantify them. Such a paradigm shift could make it easier to make effective comparisons between different studies/research.

8. Sociology's Contribution to the Assessment of Ecosystem Services

As noted by Himes-Cornell et al. [74], valuations of ecosystem services generally focus on "what the value of an ecosystem service is", leaving what people actually value about that service in the background. In this context, sociology and its theoretical input can help to understand how socio-cultural worldviews held by stakeholders influence ES priorities and demands [75]. In this line, there are several sociological theories that have been studied in the context of ES, for the consideration of intangible dimensions such as, for example, the "social theory and Bourdieu's concept of habitus", which seeks to understand the process by which relational values are socially constructed and shared [76]. Another theory studied in forest provisioning services has been the "sociological theory of risk" [77], which assumes that human perceptions of nature and society, as well as the risks associated with these perspectives, are socio-culturally constructed [78]. Finally, it is worth highlighting the research by Sotirov et al. [79] based on "behavioral theory", which combines the logic of consequences, the logic of appropriateness ("Homo sociologicus") and the logic of cognition, thus managing to incorporate the variable "behaviour" in the assessment of forest ES provision, in this case at the landscape level. For the incorporation of the sociological approach in the valuation of ES, a multidisciplinary work team is essential, in which, as Kaplowitz [80] pointed out, professionals from the fields of anthropology, applied ethics and sociology, among others, participate.

From a sociological point of view, one can speak of a common "developed/developing countries" nexus, directly related to the "rural/urban" and "local population/visitor" binomials, where the valuations and importance given to the different categories of ES (i.e., provisioning, regulating and cultural) can vary significantly. Indeed, in a previous study by Martín-López et al. [81], it was observed that ES that are essential for life, such as food (provisioning services), are less valued and perceived by the urban population. This trend carries over to the fact that, in the case of several studies conducted in both southern and central Africa, namely, in Cameroon [82] and Limpopo [83], both developing countries, provisioning services (e.g., wood, firewood, edible plants, etc.) were ranked as the most important. This is also observed in Asia in a study conducted in Nepal, where this preference is again maintained, in contrast to developed countries, where services related to the maintenance of biodiversity (regulating services) as well as cultural services predominate [71]. For example, focusing on Europe, this pattern is observed in several studies focusing on the provision of ES in Mediterranean forests, in particular in Italy [36] and Spain [70], where regulating services, such as habitat, air and water quality, are ranked first, followed by cultural services (recreational activities and ecotourism). In a study carried out in the forests of north-western Spain [69], provisioning ES are easily recognised and valued by local inhabitants, unlike urban visitors who had difficulties in identifying them. This putation holds outside of Europe; for example, in several studies conducted in the United States by Asah and Blahna [72] and Hough et al. [84], different stakeholders valued regulatory and cultural services more highly. Thus, in the cases discussed, there is a correlation directly influenced by the sociological component.

9. Methodologies of Socio-Cultural Valuation

The studies analysed use a wide range of methodological tools for the socio-cultural valuation of services provided by forests. Information on which methodologies have been used in each study sample and the number and type of actors involved is available as Supplementary Materials (Supplementary Materials S3 and S4). The most commonly used tools to collect primary information are interviews (open-ended, structured and semi-structured); different survey formats (face-to-face, online); participatory group tools (focus groups, workshops, and discussion groups); and participant observation. Interviews are more or less structured conversations through which a professional interaction between the parties involved is generated with the objective of obtaining knowledge [85]. In-depth interviews are usually unstructured or semi-structured. They are based on a script with a series of open questions that are answered during the course of the interview [86,87]. They

are particularly relevant in those cases where there is a desire to investigate an area that has previously been little explored, one which does not have a theoretical basis or one for which confirmation of the available information is sought [88,89]. The survey is a procedure in which the researcher gathers data through a previously designed questionnaire [90]. The data are obtained by posing a series of standardised questions directed at a representative sample, either face-to-face or through any impersonal media, such as postal mail, email, telephone or any digital medium [30,69]. Participatory group tools constitute a method based on surveys and discussion that are widely used to gather information in studies of the socio-cultural valuation of ecosystem services [61]. Discussion group methodology consists in guiding a group of people using a more or less structured script to obtain information about their reactions, perceptions, values, etc., regarding a study problem [91]. Workshops start with relevant findings and generate interaction between participants in a way that produces an exchange of specific information, based on their experiences and knowledge, in order to reach unique conclusions [92]. The focus group is a qualitative research method used to collect information and receive feedback by generating a discussion around a topic of study. Its main objective is not to reach a consensus conclusion but to obtain ideas to work on [93]. The composition of the groups should reflect the principal discrepancies that arise in the discursive field on the object of analysis [47]. Although a participatory group can constitute an independent evaluation tool, it is often used jointly with other assessment methods, such as participatory mapping, household surveys or the Q method [93]. Participant observation is a data gathering technique, which seeks to enable the researcher to become familiar with a specific group of individuals and their practices through an intense participation with the people in their cultural environment [94]. In the studies of the sample, participant observation has been used jointly with focus groups to test the coherence between the discourse manifested in the group discussion and day-to-day behaviour [95]. In studies on the socio-cultural valuation of ecosystem services, the tools presented are frequently used to identify the most influential groups of stakeholders or the most relevant services to evaluate, subsequently followed by the use of a survey based on the results.

On the other hand, the main methodological approaches identified in the sample of papers for the classification and measurement of ecosystem services provided by forests are participatory mapping, the Q method, photo elicitation, discourse analysis, the free listing technique, Delphi method and social media analysis. Participatory mapping is a methodology which has the objective of graphically and participatively registering the different components of a unit under study, such as the different services provided by an ecosystem, offering to situate them in space and time, determining their description and intensity and also the perceptions that the participants have of their state, distribution and management [92,96]. Participatory mapping is carried out, principally, through focus groups and, to a lesser degree, surveys or interviews. The Q method combines elements of both qualitative and quantitative research aimed at studying human subjectivity through statistical analysis in order to explore the different opinions that exist on a topic [97]. The objective of the Q method is to identify different shared perspectives that people may have regarding a specific topic. The most frequent technique in this methodology is posing a series of affirmations about a specific topic to the participant who orders them (in general from "agree" to "disagree") [61]. In the sample of studies, this methodology has been based on a focus group for its development. Photo elicitation is a methodology which combines questionnaires and photography as a visual support [87]. The objective of this methodology is to capture the preferences, attitudes and disposition towards different stimuli or elements reflected in the images. This methodology allows the barrier of a technical lack of knowledge of the participant to be overcome, as it provides a faithful image of the element to be analysed [87]. Discourse analysis is a methodology which consists in gathering (through recording or transcription) the information expressed, usually verbally, by the survey participant. This is subsequently analysed and elements useful for the object of study are identified [67]. In the valuation of services provided by forests, this

methodology has been used based on the use of a focus group in order to enable the participants to freely express their perception of the benefits that they receive from the forests. Subsequently, the different data are coded and standardised for their analysis [67]. A free list is a mental inventory of elements which an individual thinks about within a specific category [94]. This methodology consists in asking an open question to the participant who freely responds to all of those aspects that he/she considers appropriate. It is estimated that the first response options within the complete list of responses have a higher value in the mind of the participant with respect to the latter options [98]. In this way, a hierarchical list is obtained of elements that the subject values based on the object of study, in our case, the services provided by forests [94]. The Delphi method is a structural methodology that systematically brings together the judgement of a group of experts in a specific subject on which an aspect to be evaluated is raised, in such a way that, through the use of statistical tools, a common agreement can be reached among the members [99]. It is a qualitative methodology that aims to identify and organise by importance those aspects that influence complex decision-making processes [100]. The Delphi method is characterised by its successive phases, in which the participants make their judgements and then receive feedback. In this way, the process ends when a consensus result is reached [101]. Finally, the last method identified in the sample of studies is based on social network analysis. Here, the information posted on the internet by the users of a natural space is used to identify the location and intensity of use of the different services provided by the ecosystem [102]. This latter methodology is currently the least used of all those described and is not based on any other methodological tool such as surveys or focus groups, contrary to the rest.

10. Ecosystem Services and the Categories Analysed

The different studies analysed have been adapted to adapt the concepts of the different services to the reality of each case study. In this way, silvertres mushrooms have been classified as food in some studies, or as wild plants in others. In order to be able to carry out our analysis, we had to standardise the different services that appear in the works in the sample. In the end, we obtained a total of 81 different services in the 157 studies reviewed. On average, 12.1 services are analysed per study, the minimum number being one and the maximum 54. Following MEA [5], the services have been grouped into provisioning, regulatory, cultural and support services. Of the total number of services identified, the largest group is that of cultural services with 28, representing 34.6% of the total. In the category of provisioning, 22 services are included, which represents 27.2% of the total. A total of 20 services are listed in the regulation category, representing 24.7% of the total. Finally, the support category accounts for a total of 11 services, 13.6% of the total. The categories of services analysed in each of the papers that make up the sample, as well as a complete list of the services identified by each category, are available as Supplementary Materials (Supplementary Materials S5 and S6). In absolute terms, the service that has been rated in the sample as a whole the highest number of times is leisure and tourism, which appears in 105 items (66.9% of the total). It is followed by landscape beauty with 86 items (54.8% of the total), food provision and cultural identity with 70 documents (44.6% of the total), raw materials with 67 documents (42.7%), and water protection and regulation with 64 (40.8% of the total). By category, the most valued services in the cultural category are recreation and tourism, landscape beauty, cultural identity, spiritual and religious values, hunting, and the generation of income and economic sustenance. In the provisioning category, food production services, various materials, timber and firewood stand out. The provision of water for different uses, the collection of plants and medicinal remedies, and the collection of wild plants for different purposes are also noteworthy. In the regulation category, the most valued services are water regulation, climate regulation, air purification and regulation, protection against adverse events, erosion prevention and soil fixation, biodiversity protection, and pollination. None of the services included in the support category reached 10% of the documents in the sample. Within this group, soil formation, maintenance of nursery population and habitat, and provision of biodiversity stand out.

With respect to the services categories, the one which has been most evaluated is the cultural services category, with a total of 142 (90.4% of the studies of the sample). This is followed by the provisioning services category with 105 (66.9% of the studies of the sample) and regulating services with 99 (63.1% of the total sample). Only 36 documents consider the supporting services category (22.9% of the studies of the sample). With respect to the diversity of the categories included in the studies, 68.2% of the studies include more than one category of services, as opposed to 31.8%, which only evaluate one. Of the studies that only assess one category, 80.0% value the cultural category, 10.0% value provisioning services, 8.0% value regulating services, and the remaining 2% value supporting services. The majority of the total studies value three categories simultaneously, 36.9% principally provisioning, regulating and cultural. Only two studies value supporting, cultural and regulating services; the other two value supporting, provisioning and cultural services.

It is noteworthy that the definition and classification of the services is where the majority of inconsistencies have been found. Depending on the frame of reference, or, even the interpretation of the researcher or participant, the same service can appear in one category or another. For example, with respect to the soil, aspects relating to the conditions of the soil, such as humidity, fertility or erosion, are usually classified as regulating services [87,103,104]. Meanwhile, the formation of the soil is usually understood as a process classified within the supporting services [47,52,67]. However, some studies classify the formation of the soil as regulating services [61,82], or the fertility of the soil as a supporting service [65]. This occurs with other services, such as the maintenance of nursery population and habitat and lifecycle maintenance, which have been found as supporting and regulating services; genetic materials, which have been found as a provisioning [105] and regulating service [70]; and aesthetics, which appears as both a cultural [35,106] and regulating service [67].

11. Contribution of Ecosystem Services Provided by Forests to Human Well-Being

Among the main contributions of ES, in general, would be the approach itself, as already highlighted by Chan et al. [107]. Since decision-making and research on such services focuses on what matters to people, the socio-cultural benefits obtained are highly valued by the population. In the specific case of forests, they are widely recognised as the main eco-system service provider [108]. The different contributions they make to human well-being are perceived to a greater or lesser extent depending on each ES [69]. In this context, following the literature review, this section recapitulates the ES best valued by stakeholders, following the CICES classification [109], i.e., the categories of "provisioning", "regulating" and "cultural". This classification is used for potentially final ecosystem services, which are the resources and benefits that people value. This is highlighted in a study by Asah and Blahna [72], where one of the phrases most frequently used by interviewees to describe provisioning, regulating and cultural services was "human benefits".

(i) Provisioning services: "Timber resources", both as raw material [110] and fuel/energy source [82], are the first material element highlighted in forests. However, as De Meo et al. [36] point out, people also assign a high value to "non-timber forest resources", indicating that the ecosystem as a whole provides benefits for people. In this category, other contributions, such as "food production" [103,111] and "water provision" [112], are also perceived by different stakeholders. The latter is often associated with a regulating service [87,113], as it is the processes of aquifer recharge and purification that enable water provision.

(ii) Regulatory services: In this category are the services obtained by people from ecosystem regulation processes [5], highlighting "climate regulation" [61,69] and "air purification", both linked to carbon sequestration/CO_2 depletion [84,111]. Another major benefit is "habitat maintenance for animals and plants" [58,77]. Finally, "prevention of desertification" [71,110], "soil fertility" [103] and "pollination" [70] are identified as essential regulatory processes for habitat maintenance in general and the development of different activities such as agriculture.

(iii)   Cultural services: These latter services are often highly valued and perceived in the socio-cultural assessments, and this is highlighted mainly in ESs such as "recreational activities" [69] and "tourism/ecotourism" [82,84], as well as the "appreciation of aesthetics in forests" [61,84]. As De Meo et al. [36] point out, the naturalness of the forest landscape, the species, the distribution of trees and the facilities for public use are elements that enhance the recreational and tourist attraction of the forest. In summary, with these previous studies it can be highlighted, as Dobšinská and Sarvašová [114] conclude, that the main motivation for visiting forests is recreational activities. Other cultural services that contribute to human well-being and bring great value to society are those related to "education/training" [71], "cultural value" [82] and "spiritual experience" [70,82].

12. Stakeholders Involved and the Management of Protected Areas

Whereas socio-cultural valuation seeks to identify values that describe the principles, importance or preferences expressed by people towards nature, the stakeholders are the protagonists in socio-cultural valuation [48]. Therefore, we consider it relevant to identify the different groups represented in the studies in the sample. Nahuelhual et al. [96] define the stakeholders as the group which is affected by the decisions and actions taken by those responsible for decision making and which also has the capacity to influence the result of these decisions. Meanwhile, Garrido et al. [53] define a stakeholder as a person or group of people who have an investment, share or interest in the object of study, for example, the ecosystem and its services.

In the whole of the sample of studies analysed, the local population and regional and national agents have been considered as stakeholders for the socio-cultural valuation of services provided by forests. The different groups include: members of the administration at different levels (laypeople, civil servants, public administrations, forest rangers, natural park managers and workers, ministries); members of the community (community leaders, environmental non-governmental organisations, conservationists, self-employed workers, teachers, neighbourhood presidents, retired people, students, homemakers, rural population, indigenous population, heads of family, visitors, tourists, timber users, users of timber for energy, other social agents); representatives of the academic-research field (academics, local and national experts, research centres); professionals from different sectors (farmers, foresters, beekeepers, nature guides, private actors of the forest-wood chain, forest owner associations, tourism promoters, fisherfolk, the private sector in general); and the resident population in general. The average number of stakeholders participating in the studies of the sample varies between a minimum number of 6 and a maximum of 3354. The fundamental difference resides in the methodology of the study. The focus group and the personal interviews have the lowest values, while the surveys, particularly those carried out online, have the highest values. It should be noted that the participation in the focus groups varies between 4 and 18. However, some studies include a large number of focus groups in different locations, obtaining a high total number of participants with this methodology. With respect to the diversity of the interested parties, we can confirm that the studies carried out in rural environments involve a lower number of groups.

With respect to the protected areas, several protection figures have been identified: forest reserves, national parks, natural parks, biodiversity reserves, the Natura network, state parks, area of special interest for birds, biosphere reserve, ecological reserve and world heritage sites. The nomenclature varies depending on the level, the entity providing the protection and the country where it is located. A total of 46.5% of the studies in the sample include in their area of study, totally or partially, an area with some level of protection. The protected nature does not mean a greater number or categories of services analysed. One of the fundamental differences in the case of protected areas resides in a greater number of different groups involved in the socio-cultural valuation processes of forest services. On the other hand, the other major difference is the type of approach used in the studies that include protected areas and those that do not. The studies on protected areas attempt

to identify the preferences of the stakeholders to establish plans and consensual lines of management strategies of these areas, avoiding possible conflicts and non-compliance. On the other hand, the studies that do not include protected areas usually focus on the valuation so as to establish conservation measures, such as payments for ecosystem services to private landowners or the valuation of services supplied to groups highly dependent on forest ecosystems as a livelihood in rural environments.

13. Discussion

The results of this study show that the socio-cultural valuation studies of forest ecosystem services are still in an incipient phase compared with other approaches and other types of ecosystems. This finding is consistent with previous studies such as [2,31,57]. Nevertheless, all of the variables show a positive evolution, which enables us to estimate a growth trend in the interest in this topic. There is disparity between the studies in terms of specifying the concepts and the framework of reference with respect to the socio-cultural valuation in forest ecosystem studies. According to Schmidt et al. [30], socio-cultural valuation is still emerging as a methodology field in the research on ecosystem services and, to date, lacks a consistent formalisation and a balanced application in the valuation of services. In this sense, Leary et al. [65] argue that socio-cultural valuation is able to capture monetary and non-monetary values. However, in their study, they defend that "identifying the socio-cultural values of ecosystem services and integrating them with the ecological and economic valuations of the ecosystem services is the first step towards more democratic ecosystem management methods and ecosystem services management". According to our criteria, the economic valuation should be disconnected from the socio-cultural valuation, although study methodologies are shared for gathering the primary information. This is an example of the confusion surrounding the different types of value and the valuation approaches in the socio-cultural field.

The socio-cultural valuation of ecosystem services is based on the manifestation of the stakeholders regarding their perceptions. Many studies highlight that there is currently a significant lack of knowledge of the ecosystem service concept among the principal groups of stakeholders [49,65]. This could hinder the undertaking of socio-cultural valuations of ecosystem services and distort the results when they are carried out. In order to overcome this limitation, in some field studies, the concept of ecosystem services and each of the specific services that are objects of the study are previously explained to the participants. This, in turn, is criticised as being a possible bias of the researcher in the socio-cultural valuation studies. On the contrary, some authors defend that, due to the lack of technical knowledge of the concept and the framework of the ecosystem services, the stakeholders are able to recognise and transmit the impact that the services provided by the ecosystems have on their well-being [65,73]. On the other hand, photographic support can be understood as an alternative to overcome the lack of theoretical knowledge by the survey participants, as it offers a visual example of the element to be valued [87,102]. However, a possible criticism is that it introduces bias as it conditions the opinion of the participant as the elements that are included in the image can show a partial picture and eliminate elements of the landscape.

All of the documents included in the sample, which have been analysed in this study, consider the positive contribution of the ecosystem services to human well-being. However, there are very few studies that analyse the effects of synergy and rivalry between services [106,115]. Furthermore, some authors defend that the prejudices or disservices of the ecosystems, understood as negative contributions of nature, should also be taken into account to better guide the ecosystem management policies [67,69,116]. Again, there are few studies that include the joint valuation of the services and disservices, which currently continue to be largely unknown [69,106]. The results and conclusions of many of the studies analysed continue to identify a divergence between the preferences of the stakeholders and the management of the forest ecosystems, particularly through the protection figures and the restrictions that these imply [33,36,61,111,113]. This indicates

that there is a disconnection between the political and administrative sector and the public sector in general and particularly in the case of the users of the forest ecosystems. Therefore, a greater participation of the interested parties in forest management is required as a fundamental aspect to facilitate the exchange of information between those responsible for making decisions and the local community [111]. This will contribute to reducing the conflicts between the forest users and to increasing the social acceptance of the decision taken [113,117]. Finally, this study shows that socio-cultural valuation has great potential for improving the legitimacy of the decisions that are adopted in the management of forest ecosystems and for promoting consensus-building. These types of valuations can be highly useful for assessing the management of protected areas, particularly the most vulnerable and those of the highest value.

This work has been developed using a rigorous methodological procedure based on bibliometric and systematic analysis. Even so, it suffers from an important limitation, derived from the selected methodology itself. The results of this work are inevitably conditioned by the selection of the sample. Different search parameters have been used and sequenced in different ways in order to obtain the largest possible number of papers on the subject under study. The final sample of papers may under-represent some authors, institutions, or countries. However, the sample of papers analysed includes more than 600 different authors, affiliated to 69 countries from all continents. The main methodologies used (focus group, discussion group, workshop, interview, survey, participatory observation, participatory mapping, social media analysis, Delphi method, Q method, free listing, discourse analysis), in a wide variety of forest ecosystem types (urban, boreal, tropical, Mediterranean, dehesa, plantations, mangrove, protected, etc.), have also been compiled, and 81 different services of the four possible categories (provisioning, regulating, cultural and supporting) have been assessed. For all these reasons, the authors consider that our results and approaches are valid and can be extrapolated to any forest environment.

14. Conclusions

The aim of this study is to analyse the evolution of global research on the economic valuation of forest ecosystem services through a review of the existing literature on this topic. Almost 20 years after the Millennium Ecosystem Assessment, it is clear that the socio-cultural valuation of ecosystem services provided by forests is at an incipient level compared to biophysical and economic methodologies. However, it is clear that the number of works is increasing, and that a greater number of actors are involved, including researchers, centres and countries.

In addition to the number of studies carried out, there is a greater consensus in the research on the framework used in the other two approaches. This is mainly due to the difficulty of conceptualising and measuring concepts related to intangibles such as perceptions and preferences. Therefore, as a further line of work, we propose the definition of a valuation framework capable of standardising the processes in order to obtain globally comparable estimates, without losing sight of the contextual nature of social perceptions and preferences.

From an operational perspective, this paper compiles the set of methodologies used for the socio-cultural valuation of forest services. Information is provided on which categories and services have been valued, what mix of services are valued together and which are still to be valued, what type of stakeholder has been involved in each methodology, and how many subjects have been needed in each of them.

Finally, this paper discusses relevant issues to consider when conducting a socio-cultural valuation study of forest services. In addition, the main theoretical concepts, such as ecosystem functions, ecosystem services and their categories, the main classifications available, and the types of value and valuation approach are reviewed.

For all these reasons, we believe that this work can be a good starting point for initiating and updating research on the socio-cultural valuation of forest services or designing a valuation study. It also highlights the importance of continuing to promote a line of work

that is more topical than ever given society's dependence on the services provided by forests and the vulnerability of highly threatened ecosystems to threats. Figure 4 summarises the main conclusions.

Main contributions of the study

RESEARCH TRENDS	Research on the socio-cultural valuation of forest services shows a positive trend in terms of the number of papers and actors involved at the global level.
STANDARD VALUATION FRAMEWORK	There is a need for a standard valuation framework to allow comparisons between countries and regions.
METHODOLOGICAL COMPENDIUM	It compiles the different valuation methodologies used to date, including operational details for their implementation.
COMPENDIUM OF THEORETICAL CONCEPTS	This paper discusses issues relevant to the socio-cultural valuation of forest services such as the main influencing factors, and the contribution of sociology to the valuation of forest services.

Figure 4. Summary of the main findings of this study.

References

1. Costanza, R.; d'Arge, R.; de Groot, R.; Farber, S.; Grasso, M.; Hannon, B.; Raskin, R.G. The value of the world's ecosystem services and natural capital. *Nature* **1997**, *387*, 253–260. [CrossRef]
2. Aznar-Sánchez, J.A.; Belmonte-Ureña, L.J.; López-Serrano, M.J.; Velasco-Muñoz, J.F. Forest Ecosystem Services: An Analysis of Worldwide Research. *Forests* **2018**, *9*, 453. [CrossRef]
3. Daily, G.C. *Nature's Services: Societal Dependence on Natural Ecosystems*; Island Press: Washington, DC, USA, 1997. Available online: https://scholar.google.com/scholar_lookup?title=Nature%E2%80%99s+Services:+Societal+Dependence+on+Natural+Ecosystems&author=Daily,+G.&publication_year=1997 (accessed on 12 December 2021).
4. Coelho-Junior, M.G.; de Oliveira, A.L.; da Silva-Neto, E.C.; Castor-Neto, T.C.; de O. Tavares, A.A.; Basso, V.M.; Turetta, A.P.D.; Perkins, P.E.; de Carvalho, A.G. Exploring Plural Values of Ecosystem Services: Local Peoples' Perceptions and Implications for Protected Area Management in the Atlantic Forest of Brazil. *Sustainability* **2021**, *13*, 1019. [CrossRef]
5. Millennium Ecosystem Assessment (MEA). *Ecosystems and Human Well-Being: Synthesis*; Island Press: Washington, DC, USA, 2005; ISBN 1-59726-040-1. Available online: https://www.millenniumassessment.org/documents/document.356.aspx.pdf (accessed on 12 December 2021).

6. Bello, C.; Galetti, M.; Pizo, M.A.; Magnago, L.F.S.; Rocha, M.F.; Lima, R.A.F.; Peres, C.A.; Ovaskainen, O.; Jordano, P. Defaunation affects carbon storage in tropical forests. *Sci. Adv.* **2015**, *1*, e1501105. [CrossRef] [PubMed]

7. Jobbágy, E.G.; Jackson, R.B. The vertical distribution of soil organic carbon and its relation to climate and vegetation. *Ecol. Appl.* **2000**, *10*, 423–436. [CrossRef]

8. Balasubramanian, M. Forest ecosystem services contribution to food security of vulnerable group: A case study from India. *Environ. Monit. Assess.* **2021**, *193*, 792. [CrossRef]

9. Baskent, E.Z.; Borges, J.G.; Kašpar, J.; Tahri, M. A design for addressing multiple ecosystem services in forest management planning. *Forests* **2020**, *11*, 1108. [CrossRef]

10. De Valck, J.; Broekx, S.; Liekens, I.; De Nocker, L.; Van Orshoven, J.; Vranken, L. Contrasting collective preferences for outdoor recreation and substitutability of nature areas using hot spot mapping. *Landsc. Urban Plan.* **2016**, *151*, 64–78. [CrossRef]

11. Aznar-Sánchez, J.A.; Piquer-Rodríguez, M.; Velasco-Muñoz, J.F.; Manzano-Agugliaro, F. Worldwide research trends on sustainable land use in agriculture. *Land Use Policy* **2019**, *87*, 104069. [CrossRef]

12. Pacheco, P.; Mo, K.; Dudley, N.; Shapiro, A.; Aguilar-Amuchastegui, N.; Ling, P.Y.; Anderson, C.; Marx, A. Frentes de Deforestación: Causas y Respuestas en un Mundo Cambiante. Available online: https://wwfes.awsassets.panda.org/downloads/wwf_frentesdeforestacion_resumen_enero2021.pdf (accessed on 6 December 2021).

13. Geijzendorffer, I.R.; Cohen-Shacham, E.; Cord, A.F.; Cramer, W.; Guerra, C.; Martín-López, B. Ecosystem services in global sustainability policies. *Environ. Sci. Policy* **2017**, *74*, 40–48. [CrossRef]

14. Hossain, M.S.; Pogue, S.J.; Trenchard, L.; Van Oudenhoven, A.P.E.; Washbourne, C.L.; Muiruri, E.W.; Tomczyk, A.M.; García-Llorente, M.; Hale, R.; Hevia, V.; et al. Identifying future research directions for biodiversity, ecosystem services and sustainability: Perspectives from early-career researchers. *Int. J. Sustain. Dev. World Ecol.* **2018**, *25*, 249–261. [CrossRef]

15. May, N.; Guenther, E.; Haller, P. Environmental indicators for the evaluation of wood products in consideration of site-dependent aspects: A review and integrated approach. *Sustainability* **2017**, *9*, 1897. [CrossRef]

16. Peñuelas, J.; Sardans, J.; Filella, I.; Estiarte, M.; Llusià, J.; Ogaya, R.; Carnicer, J.; Bartrons, M.; Rivas-Ubach, A.; Grau, O.; et al. Impacts of global change on Mediterranean forests and their services. *Forests* **2017**, *8*, 463. [CrossRef]

17. Tinya, F.; Kovács, B.; Bidló, A.; Dima, B.; Király, I.; Kutszegi, G.; Lakatos, F.; Mag, Z.; Márialigeti, S.; Nascimbene, J.; et al. Environmental drivers of forest biodiversity in temperate mixed forests–A multi-taxon approach. *Sci. Total Environ.* **2021**, *795*, 148720. [CrossRef] [PubMed]

18. Martín-Forés, I.; Magro, S.; Bravo-Oviedo, A.; Alfaro-Sánchez, R.; Espelta, J.M.; Frei, T.; Valdés-Correcher, E.; Rodríguez-Fernández-Blanco, C.; Winkel, G.; Gerzabek, G.; et al. Spontaneous forest regrowth in South-West Europe: Consequences for nature's contributions to people. *People Nat.* **2020**, *2*, 980–994. [CrossRef]

19. Pascual, U.; Muradian, R.; Brander, L.; Gómez-Baggethun, E.; Martín-López, B.; Verma, M.; Farley, J.; Loomis, J.; Pearson, L.; Perrings, C.; et al. The economics of valuing ecosystem services and biodiversity. In *The Economics of Ecosystems and Biodiversity: Ecological and Economic Foundations*; Kumar, P., Ed.; Earthscan: London, UK, 2010. [CrossRef]

20. Seppelt, R.; Dormann, C.F.; Eppink, F.V.; Lautenbach, S.; Schmidt, S. A quantitative review of ecosystem service studies: Approaches, shortcomings and the road ahead. *J. Appl. Ecol.* **2011**, *48*, 630–636. [CrossRef]

21. Fedele, G.; Donatti, C.I.; Bornacelly, I.; Hole, D.G. Nature-dependent people: Mapping human direct use of nature for basic needs across the tropics. *Glob. Environ. Chang.* **2021**, *71*, 102368. [CrossRef]

22. Rönnbäck, P.; Crona, B.; Ingwall, L. The return of ecosystem goods and services in replanted mangrove forests: Perspectives from local communities in Kenya. *Environ. Conserv.* **2007**, *34*, 313–324. [CrossRef]

23. Kumar, P. (Ed.) *The Economics of Ecosystems and Biodiversity: Ecological and Economic Foundations*; Earthscan: London, UK, 2010.

24. Kieslich, M.; Salles, J.M. Implementation context and science-policy interfaces: Implications for the economic valuation of ecosystem services. *Ecol. Econ.* **2021**, *179*, 106857. [CrossRef]

25. Honeck, E.; Gallagher, L.; von Arx, B.; Lehmann, A.; Wyler, N.; Villarrubia, O.; Guinaudeau, B.; Schlaepfer, M.A. Integrating ecosystem services into policymaking–A case study on the use of boundary organizations. *Ecosyst. Serv.* **2021**, *49*, 101286. [CrossRef]

26. Rolo, V.; Roces-Diaz, J.V.; Torralba, M. Mixtures of forest and agroforestry alleviate trade-offs between ecosystem services in European rural landscapes. *Ecosyst. Serv.* **2021**, *50*, 101318. [CrossRef]

27. Damptey, F.G.; de la Riva, E.G.; Birkhofer, K. Trade-offs and synergies between food and fodder production and other ecosystem services in an actively restored forest, natural forest and an agroforestry system in Ghana. *Front. For. Glob. Chang.* **2021**, *4*, 630959. [CrossRef]

28. Pascal, N.; Brathwaite, A.; Brander, L.; Seidl, A.; Philip, M.; Clua, E. Evidence of economic benefits for public investment in MPAs. *Ecosys. Serv.* **2018**, *30*, 3–13. [CrossRef]

29. Aznar-Sánchez, J.A.; Belmonte-Ureña, L.J.; Velasco-Muñoz, J.F.; Valera, D.L. Farmers' profiles and behaviours toward desalinated seawater for irrigation: Insights from South-east Spain. *J. Clean. Prod.* **2021**, *296*, 126568. [CrossRef]

30. Schmidt, K.; Walz, A.; Martín-López, B.; Sachse, R. Testing socio-cultural valuation methods of ecosystem services to explain land use preferences. *Ecosyst. Serv.* **2017**, *26*, 270–288. [CrossRef]

31. Aznar-Sánchez, J.A.; Velasco-Muñoz, J.F.; Belmonte-Ureña, L.J.; Manzano-Agugliaro, F. The worldwide research trends on water ecosystem services. *Ecol. Indic.* **2019**, *99*, 310–323. [CrossRef]

32. United Nations Department of Economic and Social Affairs. United Nations Forum on Forests Secretariat 2021. The Global Forest Goals Report 2021. Available online: https://www.un.org/esa/forests/wp-content/uploads/2021/04/Global-Forest-Goals-Report-2021.pdf (accessed on 6 December 2021).

33. Breyne, J.; Dufrêne, M.; Maréchal, K. How integrating 'socio-cultural values' into ecosystem services evaluations can give meaning to value indicators. *Ecosyst. Serv.* **2021**, *49*, 101278. [CrossRef]

34. Chee, Y.E. An ecological perspective on the valuation of ecosystem services. *Biol. Conserv.* **2004**, *120*, 549–565. [CrossRef]

35. Constant, N.L.; Taylor, P.J. Restoring the forest revives our culture: Ecosystem services and values for ecological restoration across the rural-urban nexus in South Africa. *For. Policy Econ.* **2020**, *118*, 102222. [CrossRef]

36. De Meo, I.; Cantiani, M.G.; Ferretti, F.; Paletto, A. Qualitative assessment of forest ecosystem services: The stakeholders' point of view in support of landscape planning. *Forests* **2018**, *9*, 465. [CrossRef]

37. Garfield, E. Citation Indexes for Science. *Science* **1955**, *122*, 108–111. [CrossRef]

38. Aznar-Sánchez, J.A.; Velasco-Muñoz, J.F.; López-Felices, B.; Román-Sánchez, I.M. An Analysis of Global Research Trends on Greenhouse Technology: Towards a Sustainable Agriculture. *Int. J. Environ. Res. Public Health* **2020**, *17*, 664. [CrossRef] [PubMed]

39. Kumar, A.; Mallick, S.; Swarnakar, P. Mapping Scientific Collaboration: A Bibliometric Study of Rice Crop Research in India. *J. Sci. Res.* **2020**, *9*, 29–39. [CrossRef]

40. Zabavnik, D.; Verbic, M. Relationship between the financial and the real economy: A bibliometric analysis. *Int. Rev. Econ. Finance* **2021**, *75*, 55–75. [CrossRef]

41. Suominen, A.; Toivanen, H. Map of science with topic modeling: Comparison of unsupervised learning and human-assigned subject classification. *J. Assoc. Inf. Sci. Technol.* **2016**, *67*, 2464–2476. [CrossRef]

42. Durieux, V.; Gevenois, P.A. Bibliometric Indicators: Quality Measurements of Scientific Publication. *Radiology* **2010**, *255*, 342. [CrossRef] [PubMed]

43. Aznar-Sánchez, J.A.; Belmonte-Ureña, L.J.; Velasco-Muñoz, J.F.; Manzano-Agugliaro, F. Economic analysis of sustainable water use: A review of worldwide research. *J. Clean. Prod.* **2018**, *198*, 1120–1132. [CrossRef]

44. Aznar-Sánchez, J.A.; Velasco-Muñoz, J.F.; García-Gómez, J.J.; López-Serrano, M.J. The Sustainable Management of Metals: An Analysis of Global Research. *Metals* **2018**, *8*, 805. [CrossRef]

45. Gusmão-Caiado, R.G.; de Freitas-Dias, R.; Veiga-Mattos, L.; Gonçalves-Quelhas, O.L.; Leal-Filho, W. Towards sustainable development through the perspective of eco-efficiency—A systematic literature review. *J. Clean. Prod.* **2017**, *165*, 890–904. [CrossRef]

46. Velasco-Muñoz, J.F.; Aznar-Sánchez, J.A.; Batlles-delaFuente, A.; Fidelibus, M.D. Rainwater Harvesting for Agricultural Irrigation: An Analysis of Global Research. *Water* **2019**, *11*, 1320. [CrossRef]

47. Ndayizeye, G.; Imani, G.; Nkengurutse, J.; Irampagarikiye, R.; Ndihokubwayo, N.; Niyongabo, F.; Cuni-Sanchez, A. Ecosystem services from mountain forests: Local communities' views in Kibira National Park, Burundi. *Ecosyst. Serv.* **2020**, *45*, 101171. [CrossRef]

48. Walz, A.; Schmidt, K.; Ruiz-Frau, A.; Nicholas, K.A.; Bierry, A.; de Vries-Lentsch, A.; Dyankov, A.; Joyce, D.; Liski, A.H.; Marbà, N.; et al. Sociocultural valuation of ecosystem services for operational ecosystem management: Mapping applications by decision contexts in Europe. *Reg. Environ. Chang.* **2019**, *19*, 2245–2259. [CrossRef]

49. Gómez-Baggethun, E.; Ruiz-Pérez, M. Economic valuation and the commodification of ecosystem services. *Prog. Phys. Geogr.* **2011**, *35*, 613–628. [CrossRef]

50. Hirons, M.; Comberti, C.; Dunford, R. Valuing Cultural Ecosystem Services. *Annu. Rev. Environ. Resour.* **2016**, *41*, 545–574. [CrossRef]

51. Cuni-Sanchez, A.; Ngute, A.S.K.; Sonké, B.; Sainge, M.N.; Burgess, N.D.; Klein, J.A.; Marchant, R. The importance of livelihood strategy and ethnicity in forest ecosystem services' perceptions by local communities in north-western Cameroon. *Ecosyst. Serv.* **2019**, *40*, 101000. [CrossRef]

52. Cuni-Sanchez, A.; Imani, G.; Bulonvu, F.; Batumike, R.; Baruka, G.; Burgess, N.D.; Klein, J.A.; Marchant, R. Social Perceptions of Forest Ecosystem Services in the Democratic Republic of Congo. *Hum. Ecol.* **2019**, *47*, 839–853. [CrossRef]

53. Garrido, P.; Elbakidze, M.; Angelstam, P.; Plieninger, T.; Pulido, F.; Moreno, G. Stakeholder perspectives of wood-pasture ecosystem services: A case study from Iberian dehesas. *Land Use Policy* **2017**, *60*, 324–333. [CrossRef]

54. Martín-López, B.; Montes, C. Funciones y Servicios de los Ecosistemas: Una Herramienta para la Gestión de los Espacios Naturales. Guía Científica de Urdaibai, UNESCO. Bilbao, 2010: Dirección de Biodiversidad y Participación Ambiental del Gobierno Vasco. Available online: http://www.ehu.eus/cdsea/web/wp-content/uploads/2016/11/GuiaUrdaibaiC.pdf (accessed on 12 December 2021).

55. De Groot, R.S.; Wilson, M.A.; Boumans, R.M.J. A typology for the classification, description and valuation of ecosystem functions, goods and services. *Ecol. Econ.* **2002**, *41*, 393–408. [CrossRef]

56. Martín-López, B.; Gómez-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]

57. Velasco-Muñoz, J.F.; Aznar-Sánchez, J.A. The economic valuation of ecosystem services in the agroecosystems in Spain: Conceptual framework and methodology. *Pecvnia* **2016**, *22*, 75–93. [CrossRef]

58. Pastorella, F.; Giacovelli, G.; Maesano, M.; Paletto, A.; Vivona, S.; Veltri, A.; Pellicone, G.; Mugnozza, G.S. Social perception of forest multifunctionality in southern Italy: The case of Calabria Region. *J. For. Sci.* **2016**, *62*, 366–379. [CrossRef]

59. Harrington, R.; Anton, C.; Dawson, T.P.; de Bello, F.; Feld, C.K.; Haslett, J.R.; Kluvankova-Oravska, T.; Kontogianni, A.; Lavorel, S.; Luck, G.W. Ecosystem services and biodiversity conservation: Concepts and a glossary. *Biodivers. Conserv.* **2010**, *19*, 2773–2790. [CrossRef]

60. Haines-Young, R.; Potschin, M. Common International Classification of Ecosystem Services (CICES): Consultation on Version 4. Available online: https://cices.eu/content/uploads/sites/8/2012/07/CICES-V43_Revised-Final_Report_29012013.pdf (accessed on 9 December 2021).

61. Ciftcioglu, G.C. Using a combination of Q-methodology and survey-based approach for assessing forest ecosystem services of Five Finger Mountains in Northern Cyprus. *Sustain. Sci.* **2020**, *15*, 1789–1805. [CrossRef]

62. Schwartz, S.H. An Overview of the Schwartz Theory of Basic Values. *Online Read. Psychol. Cult.* **2012**, *2*, 11. [CrossRef]

63. Kenter, J.O.; O'Brien, L.; Hockley, N.; Ravenscroft, N.; Fazey, I.; Irvine, K.N.; Reed, M.S.; Christie, M.; Brady, E.; Bryce, R. What are shared and social values of ecosystems? *Ecol. Econ.* **2015**, *111*, 86–99. [CrossRef]

64. Kenter, J.O.; Raymond, C.M.; van Riper, C.J.; Azzopardi, E.; Brear, M.R.; Calcagni, F.; Christie, I.; Christie, M.; Fordham, A.; Gould, R.K.; et al. Loving the mess: Navigating diversity and conflict in social values for sustainability. *Sustain. Sci.* **2019**, *14*, 1439–1461. [CrossRef]

65. Leary, J.; Grimm, K.; Aslan, C.; Mark, M.; Frey, S.; Bath-Rosenfeld, R. Landowners' Socio-Cultural Valuation of Ecosystem Services Provided by Trees in Costa Rican Agricultural Landscapes. *Environ. Manag.* **2021**, *67*, 974–987. [CrossRef] [PubMed]

66. Fagerholm, N.; Käyhkö, N.; Ndumbaro, F.; Khamis, M. Community stakeholders' knowledge in landscape assessments–Mapping indicators for landscape services. *Ecol. Indic.* **2012**, *18*, 421–433. [CrossRef]

67. Zimmermann-Teixeira, F.; Bachi, L.; Blanco, J.; Zimmermann, I.; Welle, I.; Carvalho-Ribeiro, S.M. Perceived ecosystem services (ES) and ecosystem disservices (EDS) from trees: Insights from three case studies in Brazil and France. *Landsc. Ecol.* **2019**, *34*, 1583–1600. [CrossRef]

68. Kyle, G.; Graefe, A.; Manning, R.; Bacon, J. Effects of place attachment on users' perceptions of social and environmental conditions in a natural setting. *J. Environ. Psychol.* **2004**, *24*, 213–225. [CrossRef]

69. Rodríguez-Morales, B.; Roces-Díaz, J.V.; Kelemen, E.; Pataki, G.; Díaz-Varela, E. Perception of ecosystem services and disservices on a peri-urban communal forest: Are landowners' and visitors' perspectives dissimilar? *Ecosyst. Serv.* **2020**, *43*, 101089. [CrossRef]

70. Maestre-Andrés, S.; Calvet-Mir, L.; van den Bergh, J.C.J.M. Sociocultural valuation of ecosystem services to improve protected area management: A multi-method approach applied to Catalonia, Spain. *Reg. Environ. Chang.* **2016**, *16*, 717–731. [CrossRef]

71. Paudyal, K.; Baral, H.; Keenan, R.J. Assessing social values of ecosystem services in the Phewa Lake Watershed, Nepal. *For. Policy Econ.* **2018**, *90*, 67–81. [CrossRef]

72. Asah, S.T.; Blahna, D.J. Involving Stakeholders' knowledge in co-designing social valuations of biodiversity and ecosystem services: Implications for decision-making. *Ecosystems* **2020**, *23*, 324–337. [CrossRef]

73. Marcos, C.; Díaz, D.; Fietz, K.; Forcada, A.; Ford, A.; García-Charton, J.A.; Goñi, R.; Lenfant, P.; Mallol, S.; Mouillot, D.; et al. Reviewing the Ecosystem Services, Societal Goods, and Benefits of Marine Protected Areas. *Front. Mar. Sci.* **2021**, *8*, 504. [CrossRef]

74. Himes-Cornell, A.; Grose, S.O.; Pendleton, L. Mangrove ecosystem service values and methodological approaches to valuation: Where do we stand? *Front. Mar. Sci.* **2018**, *5*, 376. [CrossRef]

75. Peter, S. Integrating Key Insights of Sociological Risk Theory into the Ecosystem Services Framework. *Sustainability* **2020**, *12*, 6437. [CrossRef]

76. Ishihara, H. Relational values from a cultural valuation perspective: How can sociology contribute to the evaluation of ecosystem services? *Curr. Opin. Environ. Sustain.* **2018**, *35*, 61–68. [CrossRef]

77. Peter, S.; Le Provost, G.; Mehring, M.; Müller, T.; Manning, P. Cultural worldviews consistently explain bundles of ecosystem service prioritisation across rural Germany. *People Nat.* **2021**, *4*, 218–230. [CrossRef]

78. Renn, O. Concepts of risk: An interdisciplinary review part 1: Disciplinary risk concepts. *GAIA* **2008**, *17*, 50–66. [CrossRef]

79. Sotirov, M.; Sallnäs, O.; Eriksson, L.O. Forest owner behavioral models, policy changes, and forest management. An agent-based framework for studying the provision of forest ecosystem goods and services at the landscape level. *For. Policy Econ.* **2019**, *103*, 79–89. [CrossRef]

80. Kaplowitz, M.D. Identifying ecosystem services using multiple methods: Lessons from the mangrove wetlands of Yucatan, Mexico. *Agric. Hum. Values* **2000**, *17*, 169–179. [CrossRef]

81. Martín-López, B.; Iniesta-Arandia, I.; García-Llorente, M.; Palomo, I.; Casado-Arzuaga, I.; García-del Amo, D.; Gómez-Baggethun, E.; Oteros-Rozas, E.; Palacios-Agundez, I.; Willaarts, B.; et al. Uncovering ecosystem service bundles through social preferences. *PLoS ONE* **2012**, *7*, e38970. [CrossRef] [PubMed]

82. Lhoest, S.; Dufrêne, M.; Vermeulen, C.; Oszwald, J.; Doucet, J.L.; Fayolle, A. Perceptions of ecosystem services provided by tropical forests to local populations in Cameroon. *Ecosyst. Serv.* **2019**, *38*, 100956. [CrossRef]

83. Mensah, S.; Veldtman, R.; Assogbadjo, A.E.; Ham, C.; Kakaï, G.R.; Seifert, T. Ecosystem service importance and use vary with socio-environmental factors: A study from household-surveys in local communities of South Africa. *Ecosyst. Serv.* **2017**, *23*, 1–8. [CrossRef]

84. Hough, M.; Pavao-Zuckerman, M.A.; Scott, C.A. Connecting plant traits and social perceptions in riparian systems: Ecosystem services as indicators of thresholds in social-ecohydrological systems. *J. Hydrol.* **2018**, *566*, 860–871. [CrossRef]

85. Kvale, S. *Doing Interviews*; SAGE: Thousand Oaks, CA, USA, 2007; ISBN 9780761949770.

86. DiCicco-Bloom, B.; Crabtree, B.F. The qualitative research interview. *Med. Educ.* **2006**, *40*, 314–321. [CrossRef]

87. Bidegain, Í.; López-Santiago, C.A.; González, J.A.; Martínez-Sastre, R.; Ravera, F.; Cerda, C. Social valuation of mediterranean cultural landscapes: Exploring landscape preferences and ecosystem services perceptions through a visual approach. *Land* **2020**, *9*, 390. [CrossRef]

88. Weischedel, B.; Matear, S.; Deans, K.R. A qualitative approach to investigating online strategic decision making. *Qual. Mark. Res.* **2005**, *8*, 61–76. [CrossRef]

89. Schneider, J.; Ruda, A.; Kalasová, Z.; Paletto, A. The Forest Stakeholders' Perception towards the NATURA 2000 Network in the Czech Republic. *Forests* **2020**, *11*, 491. [CrossRef]

90. Sténs, A.; Bjärstig, T.; Nordström, E.-M.; Sandström, C.; Fries, C.; Johansson, J. In the eye of the stakeholder: The challenges of governing social forest values. *Ambio* **2016**, *45*, 87–99. [CrossRef]

91. Suarez, A.; Ruiz-Agudelo, C.; Castro-Escobar, E.; Flórez-Yepes, G.Y.; Vargas-Marín, L.A. On the Mismatches between the Monetary and Social Values of Air Purification in the Colombian Andean Region: A Case Study. *Forests* **2021**, *12*, 1274. [CrossRef]

92. Perevochtchikova, M.; Sandoval-Romero, G.E. Participatory community-based monitoring of water in the southwest periphery of Mexico City. *Investig. Geog.* **2020**, *103*, e60063. [CrossRef]

93. Baral, H.; Wanggi, J.; Bhatta, L.D.; Phuntsho, S.; Sharma, S.; Paudyal, K.; Zarandian, A.; Sears, R.; Sharma, R.; Dorji, T.; et al. *Approaches and Tools for Assessing Mountain Forest Ecosystem Services*; Working Paper 235; CIFOR: Bogor, Indonesia, 2017. [CrossRef]

94. De Souza-Queiroz, L.; Rossi, S.; Calvet-Mir, L.; Ruiz-Mallén, L.; García-Betorz, S.; Salvà-Prat, J.; de Andrade-Meireles, A.J. Neglected ecosystem services: Highlighting the socio-cultural perception of mangroves in decision-making processes. *Ecosyst. Serv.* **2017**, *26*, 137–145. [CrossRef]

95. Castillo, A.; Magaña, A.; Pujadas, A.; Martínez, L.; Godínez, C. Understanding the Interaction of Rural People with Ecosystems: A Case Study in a Tropical Dry Forest of Mexico. *Ecosystems* **2005**, *8*, 630–643. [CrossRef]

96. Nahuelhual, L.; Benra, F.; Rojas, F.; Díaz, G.I.; Carmona, A. Mapping social values of ecosystem services: What is behind the map? *Ecol. Soc.* **2016**, *21*, 24. [CrossRef]

97. Bredin, Y.K.; Lindhjem, H.; van Dijk, J.; Linnell, J.D.C. Mapping value plurality towards ecosystem services in the case of Norwegian wildlife management: A Q analysis. *Ecol. Econ.* **2015**, *118*, 198–206. [CrossRef]

98. Da Silva-Chaves, L.; Borba do Nascimento, A.L.; Albuquerque, U.P. What matters in free listing? A probabilistic interpretation of the Salience Index. *Acta Bot. Bras.* **2019**, *33*, 360–369. [CrossRef]

99. Rintamäki, H.; Rikkonen, P.; Tapio, P. Carrot or stick: Impacts of alternative climate and energy policy scenarios on agriculture. *Futures* **2016**, *83*, 64–74. [CrossRef]

100. Rikkonen, P.; Kaivo-Oja, J.; Aakkula, J. Delphi expert panels in the scenario-based strategic planning of agriculture. *Foresight* **2006**, *8*, 66–81. [CrossRef]

101. Flostrand, A.; Pitt, L.; Bridson, S. The Delphi technique in forecasting—A 42-year bibliographic analysis (1975–2017). *Technol. Forecast. Soc. Chang.* **2020**, *150*, 119773. [CrossRef]

102. Martínez-Pastur, G.; Peri, P.L.; Lencinas, M.V.; García-Llorente, M.; Martín-López, B. Spatial patterns of cultural ecosystem services provision in Southern Patagonia. *Landsc. Ecol.* **2016**, *31*, 383–399. [CrossRef]

103. Caballero-Serrano, V.; Alday, J.G.; Amigo, J.; Caballero, D.; Carrasco, J.C.; McLaren, B.; Onaindia, M. Social Perceptions of Biodiversity and Ecosystem Services in the Ecuadorian Amazon. *Hum. Ecol.* **2017**, *45*, 475–486. [CrossRef]

104. Zoderer, B.M.; Lupo-Stanghellini, P.S.; Tasser, E.; Walde, J.; Wieser, H.; Tappeiner, U. Exploring socio-cultural values of ecosystem service categories in the Central Alps: The influence of socio-demographic factors and landscape type. *Reg. Environ. Chang.* **2016**, *16*, 2033–2044. [CrossRef]

105. Acharya, R.P.; Maraseni, T.N.; Cockfield, G. Local Users and Other Stakeholders' Perceptions of the Identification and Prioritization of Ecosystem Services in Fragile Mountains: A Case Study of Chure Region of Nepal. *Forests* **2019**, *10*, 421. [CrossRef]

106. Bezák, P.; Bezáková, M. Landscape Capacity for Ecosystem Services Provision Based on Expert Knowledge and Public Perception (Case Study from the Northwest Slovakia). *Ekológia* **2014**, *33*, 344–353. [CrossRef]

107. Chan, K.M.; 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]

108. Pohjanmies, T.; Triviño, M.; Le Tortorec, E.; Mazziotta, A.; Snäll, T.; Mönkkönen, M. Impacts of forestry on boreal forests: An ecosystem services perspective. *Ambio* **2017**, *46*, 743–755. [CrossRef] [PubMed]

109. Haines-Young, R.; Potschin-Young, M. Revision of the Common International Classification for Ecosystem Services (CICES V5.1): A Policy Brief. *One Ecosyst.* **2018**, *3*, e27108. [CrossRef]

110. Do Rosário, I.T.; Rebelo, R.; Caser, U.; Vasconcelos, L.; Santos-Reis, M. Valuation of ecosystem services by stakeholders operating at different levels: Insights from the Portuguese cultural montado landscape. *Reg. Environ. Chang.* **2019**, *19*, 2173–2185. [CrossRef]

111. Tovar-Tique, Y.P.; Escobedo, F.J.; Clerici, N. Community-Based Importance and Quantification of Ecosystem Services, Disservices, Drivers, and Neotropical Dry Forests in a Rural Colombian Municipality. *Forests* **2021**, *12*, 919. [CrossRef]

112. Castro, A.J.; Vaughn, C.C.; Julian, J.P.; García-Llorente, M. Social demand for ecosystem services and implications for watershed management. *JAWRA* **2016**, *52*, 209–221. [CrossRef]

113. Crivellaro, M.; Camin, M.; Colle, G.; Bezzi, M.; Paletto, A. Stakeholders' perception towards ecosystem services provided by forests: Comparison among three Balkans countries. *Ann. Silvic. Res.* **2021**, *46*, 74–83.

114. Dobsinska, Z.; Sarvasova, Z. Perceptions of Forest Owners and the General Public on the Role of Forests in Slovakia. *Acta Silv. Lign. Hung.* **2016**, *12*, 23–33. [CrossRef]

115. Blanco, J.; Bellón, B.; Barthelemy, L.; Camus, B.; Jaffre, L.; Masson, A.-S.; Masure, A.; Roque, F.O.; Souza, F.L.; Renaud, P.-C. A novel ecosystem (dis)service cascade model to navigate sustainability problems and its application in a changing agricultural landscape in Brazil. *Sustain. Sci.* **2021**, *17*, 105–119. [CrossRef]

116. Feurer, M.; Heinimann, A.; Schneider, F.; Jurt, C.; Myint, W.; Zaehringer, J.G. Local perspectives on ecosystem service trade-offs in a forest frontier landscape in Myanmar. *Land* **2019**, *8*, 45. [CrossRef]

117. Branca, G.; Piredda, I.; Scotti, R.; Chessa, L.; Murgia, I.; Ganga, A.; Campus, S.F.; Lovreglio, R.; Guastini, E.; Schwarz, M.; et al. Forest protection unifies, silviculture divides: A sociological analysis of local stakeholders' voices after coppicing in the marganai forest (Sardinia, Italy). *Forests* **2020**, *11*, 708. [CrossRef]