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## **Analytical review of valuation methods for cultural ecosystem services in rural areas**

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### **Abstract**

Over the last decade, there has been an increase in academic and policy interest in cultural ecosystem services (CES) in rural areas, reflecting a growing recognition of the importance of intangible environmental benefits for wellbeing. Although the concept of CES is widely acknowledged, it is rarely fully analyzed. A significant barrier is the method for valuing CES. There has been growing research on the valuation methods of ecosystem services in rural areas, but the valuation of CES in rural areas remains relatively neglected and poorly understood in research and policy compared to other ecosystem services. Furthermore, only a few efforts have been made to comprehensively analyze the diversity of these methods and how they might be applied in rural settings.

This paper provides an analytical review of publications explicitly dealing with CES valuation methods in rural areas. It aims to fully understand the current status of CES valuation methods in rural areas, classify and analyze them, and highlight the most important challenges and gaps that need to be acknowledged. We particularly focus on: What and How many methods have been proposed to value CES in rural areas? Which CES category is most frequently examined? What are the advantages and limitations of these methods? Which methods are most frequently used in rural areas? What are the key challenges to value CES in rural areas? This paper aims to address these questions. First, we provide an overview of the current state of the literature on the topic and identify the most common CES valuation methods, then we analyze these methods in terms of their geographical scale of application, the advantages and limitations of valuation methods, and CES categories addressed by the method. Second, we identify clusters of publications that address CES in the rural landscape and highlight the key challenges of valuing CES in a rural context.

Within the different methods examined in this study, each one has strengths and weaknesses, and certain methods are most appropriate for specific situations depending on the type of information that is desired and the geographical context in which the services are evaluated. The study found that most cultural ecosystem services are best captured through deliberative and participatory methods, that if used appropriately and in combination, can help inform public decision making and establish the direction for resilient greenway planning, as well as physical and spatial planning for sustainable management of rural areas.

## 1. Introduction and literature review

Rural areas with its living and non-living natural elements, is a source of many and diverse cultural ecosystem services (CES); the nonmaterial benefits people obtain from ecosystem (Reid et al. 2005) and directly influence the life quality (Plieninger et al. 2013). The value of CES has been recognized as increasingly important by researchers in recent years, but as the Millennium Ecosystem Assessment (2005) argued, cultural services and values are not yet recognized enough in landscape planning and management, therefore the implications for rural landscape development is till poor and under-research. Although numerous studies have been undertaken on ecosystem services in rural landscapes in the past ten years or more, significantly fewer studies have focused on CES, even though the concept of CES in rural areas has been well accepted. A significant barrier is the method for evaluating CES. ‘Evaluation’ means the process of assessing the value of something. Scientific literature proposed a number of terms to distinguish specific methodological approaches, often used synonymously, including valuation, assessment, accounting, mapping, quantifying, etc. (Cheng et al. 2019).

Throughout the last decades, there have been numerous studies on CES and their evaluation methods. These studies apply diverse methods but share the commonality of assessing CES. For example, In the report TEEB: The Economics of Ecosystems and Biodiversity Ecological and Economic Foundations, valuation methods were generally classified into biophysical methods and preference-based methods (Bishop 2010). In their work (Hirons, Comberti, and Dunford 2016) classified the methods into three groups; methods that prioritize monetary valuation, methods that prioritize nonmonetary values, and methods that prioritize stakeholder understanding, social learning, and the coproduction of knowledge. In their review of valuation methods, (Carson and Bergstrom 2003) identified market and non-market values, use and non-use values and revealed and stated preference methods of ecosystem valuation. The majority of research papers have reviewed valuation methods through the lens of monetary and non-monetary methods and in accordance with the stated preference and revealed preference methods, see (Christie et al. 2012, Guijarro and Tsinaslanidis 2020, Lapointe, Cumming, and Gurney 2019, Orenstein and Groner 2014, Yang et al. 2019, Plieninger et al. 2013).

Although the problem of CES evaluation has been increasingly addressed, few efforts have focused on systematically reviewing the diversity of these methods and its application in rural landscape. A few studies addressed the topic in rural context such, (Angelstam et al. 2021, Arki et al. 2020, Balazsi et al. 2021, Bileva et al. 2020, Csurgo and Smith 2021, Gosal and Ziv 2020, Hartel et al. 2014), but the whole body of existing literature still lacks a comprehensive framework for specifically addressing the application of CES valuation methods in rural landscape taking into account the different and diverse land uses and the special features and challenges of a rural context. This paper aims to conduct a systematic literature review on CES valuation methods in rural context. It discusses problems and challenges of existing studies, distribution of CES categories, implications and applications of valuation methods in rural contexts, advantages and limitations of valuation methods, and challenges for future study. We particularly focus on What kind of methods are currently used for CES valuation in rural contexts? Which CES category is most frequently examined? Which are the most frequently used/suitable valuation methods in rural areas? What are the advantages and limitations of these methods? And What are the key challenges to value CES in rural areas?

## 2. Method and Data

To address our research objectives, we reviewed existing literature on cultural ecosystem services valuation methods in rural areas. We used ISI Web of Knowledge (WOK) databases (<https://webofknowledge.com>) to perform a search for peer-reviewed articles or book chapters on cultural ecosystem services in rural contexts. The literature searches were performed on 2 March 2022. Non-English language searches were not conducted in this review. Different terms and combinations have been used to perform a search for papers containing these terms in the title, abstract or keywords.

### 2.1. Paper selection

We limited the literature set to items published between 2005 and 2021. We focus on this period because 2005 was the year that the Millennium Ecosystem Assessment synthesis reports were published. Since then, CES were officially defined as a framework to promote understanding of ecosystem functions and processes, and gained particular attention as reflected in the number of scientific publications on CES.

The results obtained from the WOK database are reported in Table 1. Since our research is related to the field of landscape planning, we used the term “Landscape” in search query to exclude studies from irrelevant disciplines. Furthermore, the use of different and more specific terms in the queries allowed to better highlight the differences in the amount of research about the topic. The results from queries showed a limited set of papers dealing explicitly with CES valuation methods in a rural context (44 papers) when compared to the results of the same terms but without the term “rural” (1,146 papers). These results clearly indicate how the real application of methods for valuing CES in rural contexts is still unexplored enough in research.

We decided to merge results from WOK queries Q2 and Q3 in order to have a broader set of examples of CES valuation methods that could be used in rural contexts. We then verified the relevance of the results obtained from our search queries by checking their titles, key words, abstracts to specifically select the publications about CES valuation methods in rural contexts. If a paper merely mentioned CES valuation methods, the work was excluded from further consideration. This screening resulted in 137 papers from Q2 and only 8 from Q3. Of these, 50 studies were excluded from Q2 and 6 from Q3 because they did not quantitatively assess particular CES with a specific approach (e.g., review papers and policy analysis papers) or they were studies with a global focus. For the remaining 89 articles (Q2+ Q3), they were read in detail and analyzed based on our proposed analytical framework.

**Table 1. Results from queries to ISI Web of Knowledge (periods: 2005-2021).**

Searched terms	ISI Web of Knowledge			
	Research results	After screening		
		all	Review paper	Case study
Q1: “cultural ecosystem services” AND “Landscape” AND “value” OR “valuation”	1,146	-	-	-
Q2: “cultural ecosystem services” AND “Landscape” AND “rural”	282	137	50	87
Q3: “cultural ecosystem services” AND “Landscape” AND “value” OR “valuation” AND “rural”	44	8	6	2

2.2. Analytical framework: Classification of the identified papers

As previously stated, the aim of the review was to obtain a refined list of CES valuation methods that are currently used in rural contexts. To achieve that papers were analyzed using a list of assessment criteria (in the form of questions/choices; Table 3), which was developed based on criteria used in existing reviews on CES and issues unique to rural contexts.

**Table 3. Analytical framework for the selected paper divided into 3 groups**

Analysis groups	Analysis questions	Options for entries	Results of the analysis presented in Figure
General results CES and valuation methods	Which types of CES are evaluated?	cultural diversity and identity, spiritual and religious values, knowledge systems, educational values, inspiration, aesthetic values, social relations, sense of place, cultural heritage, recreation and ecotourism	<b>Figure 1.</b>
	What kind of valuation methods is applied?	monetary, non-monetary, both, not applicable	
	What type of model is used to value CES?	market price, travel cost, hedonic pricing, benefits/value transfer, deliberative valuation, contingent valuation, choice experiments, observation, documents, social-media based, interview, questionnaire, focus group, expert based, q-method, participatory mapping.	
Main focus: Rural contexts	In which country is the case study located?	name of the country where the study is located	<b>Figure 2.</b>
	What is the relevance of the rural context in the study?	agricultural landscape/ farmland, rural surrounding/ villages, forests, rural-urban gradient, cultural/ historical landscape, water surfaces	<b>Figure 3.</b>
Trade-offs and implementation of the valuation methods	What kind of valuation methods is applied?	monetary, non-monetary.	<b>Figure 4.</b>
	Are trade/off considered?	no, between CES, between CES and ES, between land use and CES, between CES and human wellbeing, between CES and decision making, other, not applicable	<b>Figure 5.</b>
	Who is involved in the assessment process?	rural residents, tourists, stockholders group, farmers, focus group, community members, experts & professionals.	<b>Figure 6.</b>
	Is the approach implemented?	tool/ toolkit, communication, plan/ strategy, awareness, no, not applicable	<b>Figure 7.</b>

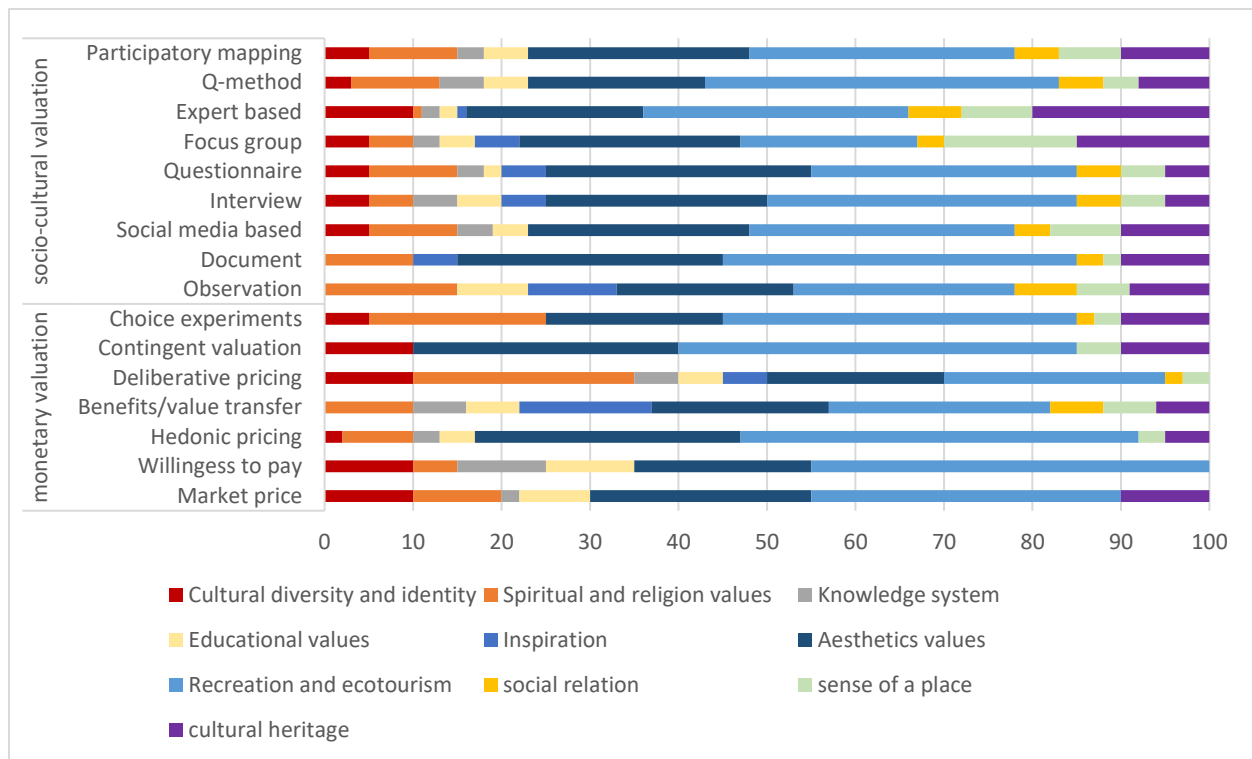
Based on the Millennium Ecosystem Assessment classification, this study identified which CES categories were investigated. The categories were reorganized to fit the MEA classification system because writers used different terminology in accordance with different CES classification schemes (e.g., TEEB or CICES classification systems). For example, the term 'spiritual and religious values' (CICES v4.3) and 'information and cognitive development' (TEEB) all relate to 'spiritual and religious values' (MEA). Each paper was reviewed for CES valuation methods. Then based on literature review and other recognized review papers on CES valuation methods, the selected valuation method from our research were divided into two categories: monetary and non-monetary methods.

### 3. Results

#### 3.1. CES valuation methods

This study included 16 CES valuation methods which employed different procedures and techniques. There were 7 monetary valuation methods detected in the search; Market price, travel cost, hedonic pricing, benefits/value transfer, deliberative valuation, contingent valuation, and choice experiments. And 9 non-monetary methods; observation, documents, social-media based, interview, questionnaire, focus group, expert based, Q-method, and participatory mapping.

The CES categories were evaluated in a highly disparate manner as shown in Figure 1. The majority of studies assessed recreation and ecotourism, followed by aesthetic values, spiritual and religious values, and cultural heritage. The least emphasis was paid to social relations, knowledge systems, and cultural diversity and identity. The remaining categories were appraised less frequently than recreation and ecotourism, as well as aesthetic values.

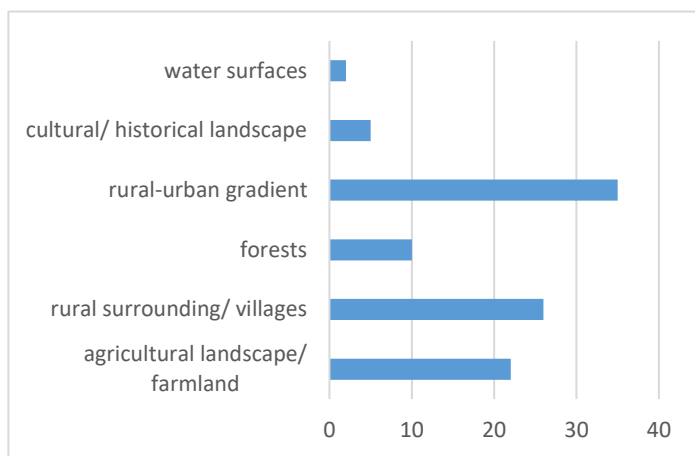


**Figure 1. Distribution of CES categories corresponding to each evaluation method. This graph is made up of 16 bars that represent 16 different valuation methods, each of which displays the CES categories that were evaluated using that approach (% of 89 entries).**

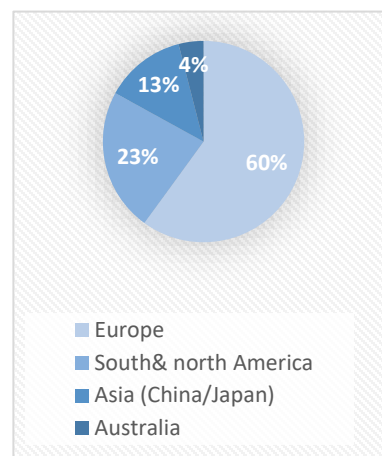
#### 3.2. The spatial contexts of valuation methods

The main focus of our research is to determine the spatial context in which CES valuation methods are used, especially in terms of rural contexts. The majority of papers are published in Europe with approximately 60% of research papers resulted from research in WOK database as shown in Figure 2, and the other 40% is distributed in Asia, North America, South America and Australia, with no records of any papers in the Middle East or the MENA region. The majority of CES research are

conducted in urban-rural gradient where CES were evaluated, around 40% of 89 entries, Figure 3. While the rest of papers were distributed in a more relevant context to rural; rural surroundings and agricultural land were among the most studied contexts, then studies on CES in forests and protected land. Only a few amount of papers was directed towards valuing CES in cultural and historical landscape, and water surfaces.



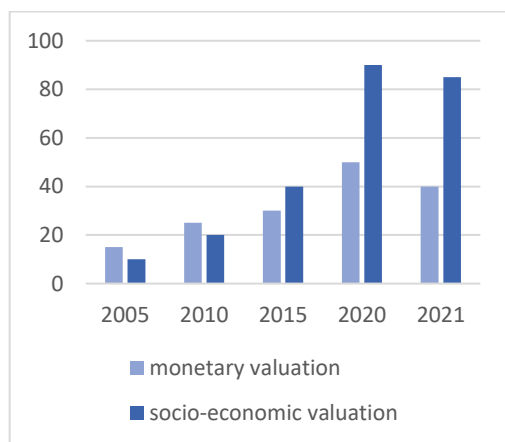
**Figure 3. Rural relevance of research papers. The majority of papers are conducted in rural-urban gradient context.**



**Figure 2. Number of papers per continents on CES valuation methods in rural contexts during the period 2005-2021 (% of 89 entries).**

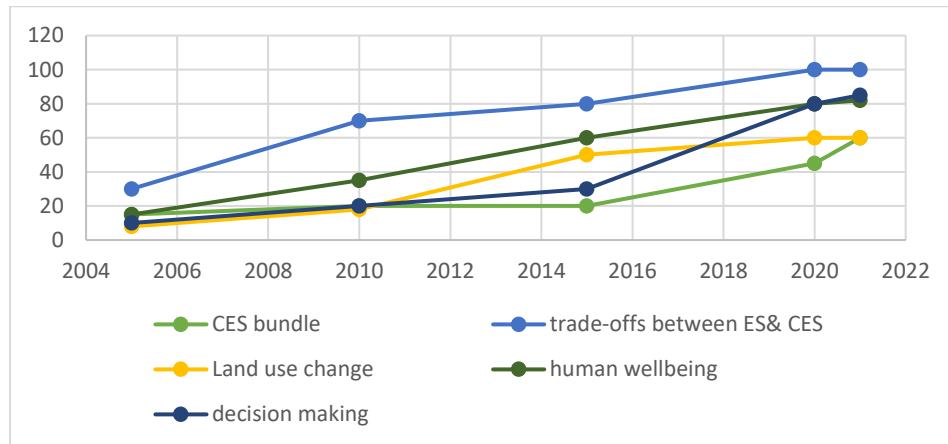
### 3.3. Implementation of valuation methods

A significant shift in research direction is observed in Figure 4, where the interest in using non-monetary valuation methods has increased in the past few decades. A considerable amount of research is now focusing more on valuation approaches that have a socio-economic background to capture the intangible nature of CES. Many CES research has studied the trade-offs and interactions between these services and other factors such as (land use change, human wellbeing, decision making, other ecosystem services “ES”, etc.) as shown in Figure 5.



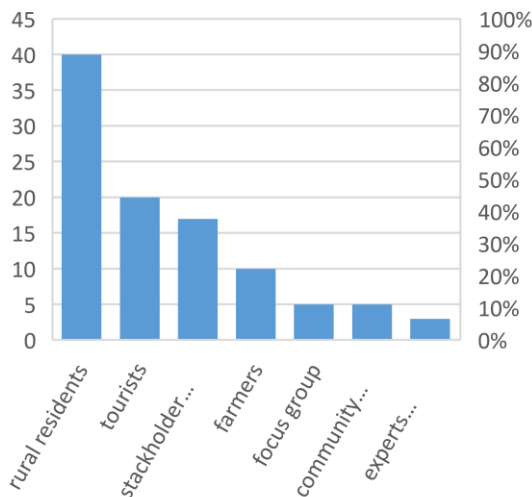
**Figure 4. Number of papers per year between 2005 and 2021 using monetary and socio-economic valuation. Socio-economic valuation methods show a significant increase compared with monetary valuation methods.**

Research on the trade-offs between CES and ES has the largest amount of papers. While there is a significant increase in research dealing with the importance of CES for decision making and human wellbeing, a gradually increase is observed in research specifically studying CES as a bundle of services. The impacts of land use change in relation to CES have also recently got an increasing attention among other CES research disciplines.

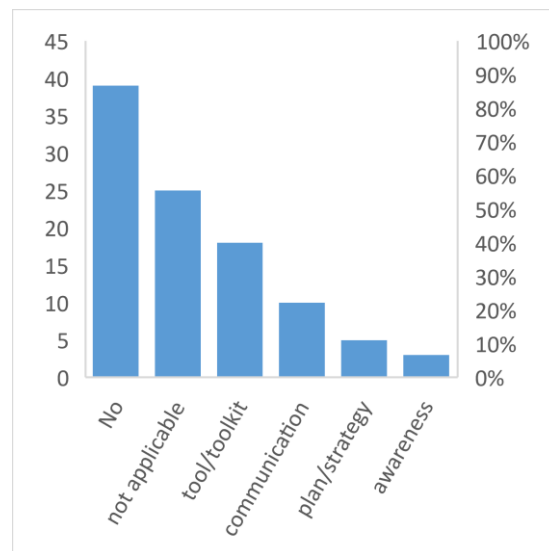


**Figure 5. Trade-offs in CES research during the period 2005-2021. Research on the importance of CES in decision making has significantly increased during the last years**

Figure 6 shows the main stakeholders included in the assessment process. The majority of studies included the locals (residents) and tourists in the valuing process, in addition to a considerable amount of studies that gave a special attention to a selected group of stakeholders, selected community members, or focus group. Implementation of CES valuation methods in rural areas still lack a comprehensive framework, only a small amount of studies has been implemented through tools, communication, strategy or awareness campaign, Figure 7.



**Figure 6. Stakeholders involved in CES valuation methods (% of 89 entries)**



**Figure 7. Methods of implementation of CES valuation methods (% of 89 entries)**



#### 4. Discussion and Conclusion

The results of our literature review research shows how most of the valuation methods used in the studies focus primarily on recreation and ecotourism values of ecosystem in rural areas and secondary on its cultural heritage values, which align with results from other review papers in urban context (Cheng et al. 2019, Christie et al. 2012, Hirons, Comberti, and Dunford 2016, Gómez-Baggethun and Barton 2013). The main reason for this heterogeneity in addressing CES categories in research might be the lack of a consistent classification among the three international classification systems. (e.g., MEA, CICES, and TEEB), in addition to the lack of clear definition for each category. This reasons can justify why researcher tend to favor studying recreation and ecotourism services among others, since these services have a clear and demarcated definition, and are the most consistent categories in all of the three recognized classification framework. Another factor could be the researcher's disciplinary background, which influences the research field and the approaches and methods used. For example, there is plenty of research on cultural heritage values, but most of it comes from a cultural landscape perspective rather than an ecosystem services perspective.

Scientific research have used different terms to refer to valuing CES, these different terms often refer to different theoretical concepts, and they apply diverse methods but share the commonality of assessing CES (Gowdy, Howarth, and Tisdell 2010). In general, monetary values treat values as assigned values which help conduct trade-offs between CES and other ES. Non-monetary valuation refers to a service's relative importance or value to an individual or group in a specific social context. There is a growing interest in using non-monetary valuation due to the nature of some CES categories that cannot be capture by monetary methods, such as cultural diversity and identity, social relation, and knowledge system. Most non-monetary methods are abstract and depend heavily on public perception, which make it essential to take the demographic and socioeconomic background into accounts. The use of combination of methods (monetary, and non-monetary) is very important, in terms of focusing on the interactions between these methods, especially deliberative methods such as willingness to pay that integrate deliberative techniques into questionnaires or interviews, participatory mapping techniques which is a powerful tool to link the physical features with human perceptions of a place, and identify the distribution of CES. In addition to the rising interest in using social media-based method, which uses relatively freely available and spatially explicit data, to provide a good overview of CES mapping.

Regarding the spatial context and implementation of the studies, the majority of the reviewed papers presented information on the value of CES at regional or local scale, but mainly in urban-rural gradient context (Arslan et al. 2021, Arnaiz-Schmitz, Herrero-Jauregui, and Schmitz 2021, di Cristofaro et al. 2020, O'Donoghue et al. 2020). Other studies presented the value of CES in a specific landscape in rural context such as, agricultural landscape, cultural landscape or specific forests or farmland (Ciftcioglu 2021, He et al. 2019, Di Fazio and Modica 2018). Rural areas as a whole context are still not well presented in CES research mainly because of the challenges of available data and the challenging nature of CES 'intangible', 'nonmaterial' and 'invisible' compared with other material services. An analysis of the relation between process of land use change (urbanization, agriculture, etc.) including impacts assessment on CES have increased in recent years, information is required to assess the effects of previous urbanization patterns and planning decisions, as well as to understand potential future impacts of urbanization. This

information is typically related to land use and/or land cover change, and can further affect future policies on greenway and green infrastructure planning in rural areas.

The implementation of valuation methods to decision making in most reviewed studies were quite limited. The overwhelming majority of articles included only short, general recommendations for stakeholders, and only a few studies address implementation in decision making, these implementations included awareness raising and communication, strategic planning, and the development of tools and toolkits. However, some papers highlighted the importance of refinement or adjustment of the approach, their potential in assessing greenway planning and development in rural areas, as well as their limitations and the complementary measures needed for successful implementation. Despite the fact that valuing CES in rural areas presents several conceptual and methodological challenges, it is of a great interest and importance due to the connections between cultural values, valuation methods, and individual and collective decision-making that influence the direction of greenways and landscape planning in rural areas.

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