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Opportunities for recreation and tourism: A meta-analysis of the economic value at global level

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Abstract: Ecosystem services (ES) are defined as "*the direct and indirect contributions of ecosystems to human wellbeing*" The release of the Millennium Ecosystem Assessment (MA) established the groundwork for research in this field. Subsequently, there has been a remarkable increasing in interest in ecosystem services (ES) valuation, leading to the advancement, enhancement, and dissemination of various qualitative and quantitative methodologies. The investigation of the economic value of these services/benefits and its drivers, is crucial to the scientific debate, particularly to allow an estimate of the monetary value. As a consequence, support for the decision maker is provided to improve policy to the drivers that potentially have a positive effect on these ES. Considering the significance of ecosystem services (ES) for the sustainable advancement of contemporary society, this study endeavors to explore potential factors influencing ES values related to recreational and touristic opportunities on a global scale using meta-regression analysis. The investigation spans the years 1975 to 2021. Data for this study were sourced from the Ecosystem Service Valuation Database (ESVD), renowned as one of the most extensively utilized databases for ecosystem service valuation (ESV). Main findings show the existence of a difference in the assessment of the ES value for recreational and touristic opportunities in favor of the latter. This difference is more evident in Southern American countries, in which the number of studies published in the field appears low. Furthermore, the degree of protection of the study area is another relevant factor providing a positive effect on the economic value of ES. This result could be supported by the increasing number, over time, of protected areas across the globe. The findings of the present study would help policy makers to develop ad-hoc policies (e.g. financial incentives to increase the number of protected areas) and implement appropriate spatial strategies tailored to the geographical features and territorial characteristics of the area under

investigation.

Keywords: *economic value; cultural ecosystem services; recreation and tourism ecosystem services; meta-regression.*

JEL Codes: Q01, Q54, Q57, Z32

1. Introduction

Since the definition of Ecosystem Services (ES) (Costanza et al., 1997), the acknowledgment of the existence of the relationship between nature and human beings has been strengthened (Costanza et al., 2014; Daily, 1997; Pascual et al., 2010). Ecosystem services are defined as all direct and indirect benefits that humans receive from the environment (MA, 2005). Based on the benefits provided to nature and human beings, they may be divided into groups.

The consequences of the interest in the investigation of this linkage and the possible economic assessment have caused the development, improvement, and spread of different classifications of ES and qualitative and quantitative methods to assess their economic valuation (Pisani et al., 2021; Pisani et al., 2022; Morando-Figueroa et al., 2023; Raihan, 2023). In accordance with the Common International Classification of Ecosystem Services (CICES) (Haines-Young and Potschin, 2013), there are three ES categories: provisioning (e.g., food, timber wood, water supply), regulation and supporting (e.g., water purification, nutrient cycling) and cultural (recreational and tourist opportunity). Recreational and touristic opportunities assessment have been widely analyzed over time, but rarely considered from an ES perspective and from the drivers that influence their perception at the global level (Hynes et al., 2018; Hermes et al., 2018). None of the studies conducted on this topic consider the bioma or the realm, the level of protection, and the spatial factor (i.e., where the study was conducted) as key explanatory variables of the ES value. The aim of the present paper is to explore the potential factors influencing the value of opportunities for recreation and tourism at worldwide level through a meta-regression analysis.

The investigation of the economic value of these services/benefits and their drivers is crucial to contribute to an estimate of the monetary value. This study can support the policy maker to set and improve ad-hoc or existing policies toward drivers that may positively affect these ES.

2. Literature review and theoretical framework

At the international level, three main different classifications exist: the Millennium Ecosystem Assessment (MA, 2005); The Economics of Ecosystems and Biodiversity (TEEB) (Kumar, 2010), and the Common International Classification of Ecosystem Services (CICES) (Haines-Young and Potschin, 2013).

According to the latter, three ES categories can be listed: provisioning (e.g., food, timber wood, water supply), regulation and support (e.g., water purification, nutrient cycling), and cultural (recreation and tourism opportunity).

The Millennium Ecosystem Assessment defines cultural ecosystem services as "*the nonmaterial benefits people obtain from ecosystems through spiritual enrichment, cognitive development, reflection, recreation, and aesthetic experiences*" (MA, 2005). According to the CICES (Haines-Young and Potschin, 2013), cultural ecosystem services are defined as "*the experiential and intangible services related to the*

perceived or actual qualities of ecosystems whose existence and functioning contributes to a range of cultural benefits".

As a consequence, cultural ecosystem services include a variety of benefits, such as cultural heritage, spiritual value, recreation opportunities, and human health and well-being (Derreck et al., 2019). It should be noted that, although the positive effects provided by this group of ES on human health are widely recognized, the quantification of these benefits is lacking and research is needed to better inform interested communities on the relationship between natural areas and human health and well-being (Thomsen et al., 2018).

Opportunity for recreation and tourism can be addressed within the cultural ecosystem services. The existence of this subcategory of ES is due to those ecosystems also being regarded as valuable places for physical, and mental restoration, recreation, and touristic activities (Haider, 2005). According to the pioneering work of Haider (2005), health indicators such as blood pressure, heart rate, or stress hormones have been used to assess the positive effects provided by the above ES. In addition, the time spent in a natural environment has proved beneficial to human health, such as the stabilization of heart rate (Lee et al. 2011, Li et al. 2008, Schobersberger et al. 2010), the reduction of the production of stress hormones (Lee et al. 2011); the reduction of blood pressure, heart rate, and stress hormones, such as urinary adrenaline and noradrenaline and salivary cortisol (Li 2010), and the increasing of human natural killer (NK) activity, number of NK cells, and intracellular levels of anti-cancer proteins, suggesting a preventive effect on cancers (Li et al. 2008; Li et al. 2008, Li 2010).

In addition, the understanding of psychological well-being derived from spending time in a natural environment can also be useful for the promotion of particular destinations.

Willis (2015) explored the viability of employing well-being as a guiding principle for tourism destination strategies, highlighting the destination's capacity to elevate overall well-being. This approach has the potential to significantly enhance destination management by prioritizing aspects important to individuals. Relying solely on a rational and economic planning approach might overlook opportunities to foster and enrich the more subjective aspects such as 'poetic, moral, spiritual' experiences, intuitive, and relational insights' (Hughes, 1995) of tourist experiences.

Over the past decade, these activities have played a key role in achieving nature conservation goals. These are considered potential drivers of protection and improved sustainable management activities (Rylance et al., 2017; Banerjee et al., 2018).

The international literature on environmental valuation recognizes two main groups of valuation techniques such as *price and value estimation methods*. (Bateman et al., 2011; Pearce et al., 2006; Freeman et al., 2014).

In price estimation methods, the economic value represents the market price of the goods under study or comparable items (e.g., market price, damage cost avoided, restoration cost, shadow price, or mitigation cost) (Wilson and Carpenter, 1999; Hussain and Badola, 2010; Chen and Wu, 2018; Markandya et al., 2018). While, value estimation methods are methodologies based on consumer preferences and the theory of value of Lancaster (1966). According to Lancaster (1966), all types of goods have their features. For each good, a utility level is associated (i.e., the level of satisfaction) according to each feature associated with the consumption of a given quantity of the good (Monica et al., 2008; Baker and Ruting, 2014). This group of methodologies could be divided in methods using direct or stated preferences such as contingent valuation (Champ et al., 2005) and choice experiment approaches (Scarpa et al., 2007; Obeng and Aguilar, 2018; La Notte et al., 2021; Xu & He, 2022) and methods using indirect or revelated preferences such as hedonic price (Lansford and Jones, 1995; Pearson et al., 2002; van Dijk et al., 2016) and *travel cost* (Ward

et al., 1986; Alberini and Longo, 2006; Mayer and Woltering, 2018; Mäntymaa et al., 2021). In particular, *contingent valuation* is a methodology widely used to assess the economic value of goods or services that do not have an explicit market price. This technique asks people how much they would be willing to pay for such goods or services, or how much they would be willing to receive to give up. Moreover, the contingent assessment could be used to assess the importance of a national park for visitors or to determine the economic value of a protected natural area for the conservation of biodiversity. *Travel cost analysis* is a methodology used to assess the economic value of non-market attributes, such as the quality of the environment. Instead of asking people directly how much they would be willing to pay for some environmental benefit, environmental economists instead look at how much people spend on traveling and exploiting those benefits. These data are then analyzed to infer people's preferences and the value they attach to certain environmental aspects.

Another method that does not fall into the two categories above is the *benefit transfer method* which considers the economic value resulting from similar studies and is thus considered as a proxy for the assessment (Robinson, 2002; Liu and Costanza, 2010; Johnston et al., 2015).

Zandersen et al (2008) investigated, with the use of a meta-analysis, the drivers affecting the economic value obtained from a travel cost analysis of recreational ES at the European level. Brander et al. (Brander et al., 2007) analyzed the economic value of recreational ES at the global level provided by the coral reefs. Huber et al. (2020), again with a meta-analysis, captured the insights offered from willingness to pay studies for cultural services from grasslands in Europe (Huber et al., 2020).

The main aim of the present work is exploring the potential factors influencing the value of opportunities for recreation and tourism on worldwide level through the implementation of meta-regression analysis. The dataset comprises 467 observations from 157 studies and was obtained from the Ecosystem Service Valuation Database (ESVD, 2021[1]; de Groot et al., 2012), one of the most extensively utilized databases for ecosystem service valuation (ESV)[2].

3. Methodology

The present study is developed according to the following steps: (*i*) Data retrieval through identification of relevant articles about the economic value for recreation and tourism opportunities provided by the ESVD; (*ii*) inclusion of additional variables which are not present in primary studies; (*iii*) inferential analysis.

3.1. Data collection and compilation

All studies are selected from the category "*opportunity for recreational and tourism*", according to the TEEB (Kumar, 2010) definition of the ESVD.

The initial dataset comprises 950 observations from 306 studies. After an initial screening process[3] a sample of 542 observations from 178 articles is obtained.

Although the ESVD database provides a large amount of information about ES, it does not provide socio-economic information about the country where studies were conducted. The World Bank

[1] https://www.esvd.net/login/esvd

[2] The ESVD database provides the economic value of ES normalized for US$ per hectare for year per 2020 price ($/ha/year).

[3] Lack of any economic valuation (381 observations from 118 studies); lack of studies area dimension (27 observations from 10 studies).

online database[4] was used to overcome this lack. This source allowed to obtain information about population density and GDP. The World Bank database was harmonized with the ESVD data by implementing a normalization process with a base year of 2020. To avoid biased results it was performed the interquartile range criterion (Schwertman et al., 2004). According to this criterion, deleting extremely small outliers, Q1-1.5*IQR, and extremely large outliers, Q3+1.5*IQR, where IQR = Q3-Q1 and Q1 and Q3 are respectively the first and third quartiles of the distribution, it is possible avoid biased results. The final meta-regression analysis database comprises 467 observations from 153 studies.

Table 1 shows the number of studies according to the categories 'realm', 'continent' and 'protected areas'. Starting from the latter, 83 studies (54.25%) investigated the economic value for opportunities of recreational and tourism in protected areas, whereas *Asia* presents the largest number of papers (29 studies, 59.18%) and *South America* and *Oceania* show the largest relative number of studies in this field (respectively: 8 studies, 88.88%; 12 studies, 75%). *Table 1* also shows a relevant imbalance across studies in terms of space and type.

In terms of realms, 57 studies (37.25%) assess *Transitional* and *Marine* (49 studies, 32.02%) ecosystems, respectively. At spatial level, the majority of studies deals with *Europe* (15 studies, 42.85%) and *North America* (12 studies, 40%), whereas *Asia* is the continent with the largest number of studies on the *Transitional* realm in absolute terms (18 studies). In terms of *Marine* ecosystem, *North America* shows the largest number of studies, both in relative and in absolute terms (16 studies, 53.33%).

Deepening the analysis, there exists a lack of investigation in the field of the economic value of opportunities for recreational and tourism particularly evident in *South America.* The imbalance of studies is presented in *Figure 1.* It is evident how the majority of studies are focused on *United Kingdom* (13.8%), *USA* (9.8%), and *Australia* (8.5%)

Table 1. Number of studies divided for each continent realm and protection.

Continent	***Realm***				***Protected area***	***Tot***
	Fresh water	*Marine*	*Terrestrial*	*Transitional*		
Africa	3 (7.14%)	3 (21.42%)	4 (28.57%)	4 (28.57%)	9 (64.28%)	14
Asia	10 (20.40 %)	11 (22.44%)	10 (20.40 %)	18 (36.73 %)	29 (59.18 %)	49
Europe	4 (11.42 %)	5 (14.28%)	11 (31.42%)	15 (42.85%)	15 (42.85%)	35
Oceania	0 (0.00%)	12 (75.00%)	2 (12.50%)	2 (12.50%)	12 (75.00%)	16
North America	1 (3.33%)	16 (53.33%)	1 (3.33%)	12 (40.00%)	10 (33.33%)	30
South America	0 (0.00%)	2 (22.22%)	1 (11.11%)	6 (20.00%)	8 (88.88%)	9
Tot.	***18 (11.76%)***	***49 (32.02%)***	***29 (18.95%)***	***57 (37.25%)***	***83 (54.25%)***	**153**

Source: Authors elaboration

[4] https://data.worldbank.org/

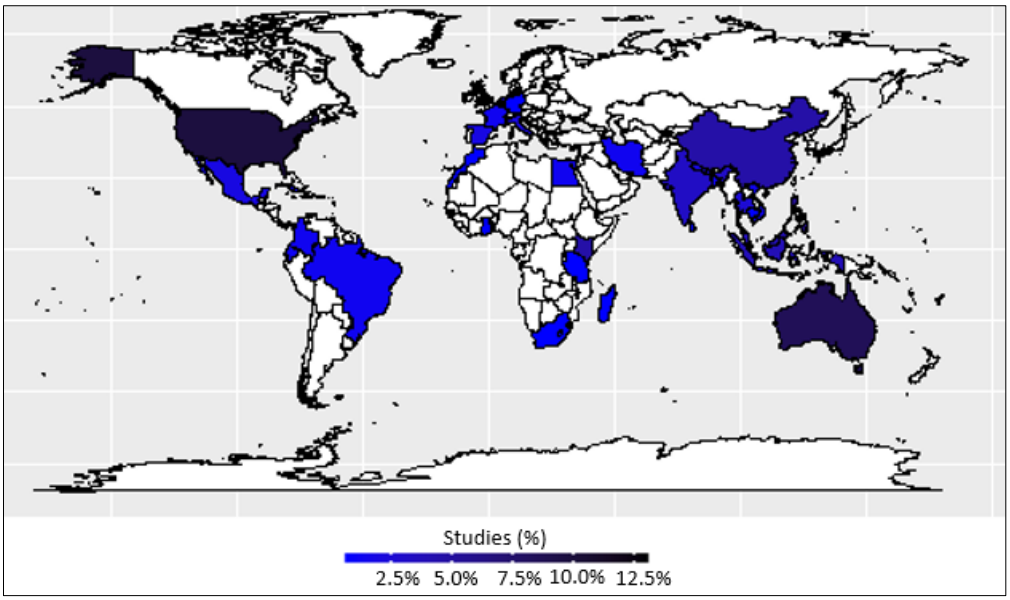

Figure 1. Percentage of studies per each country. *Source: Authors elaboration*

3.2. Meta-regression model

Table 2 showcases the variables incorporated into the meta-regression model. The dependent variable (y) represents a vector of US dollars per hectare per year, adjusted to the baseline price year of 2020. While, there are three categories of explanatory variables: socio-economic characteristics (x_{sec}), study characteristics (x_{sc}), and ESs or realm characteristics (x_{bc}).

Table 2. Variables included in the model

Variable	Description of variable	Mean	Std.dev	N° obs
Socio-economic characteristics				
GDP per capita	Log of GDP per capita	10.339	0.790	467
Population density	Log of population density	5.061	1.463	467
Africa	Dummy: 1 = African country; 0 = otherwise	0.044	0.207	21
Asia	Dummy: 1 = Asian country; 0 = otherwise	0.156	0.363	73
Europe	Dummy: 1 = European country; 0 = otherwise	0.490	0.500	229
Oceania	Dummy: 1 = Oceania country; 0 = otherwise	0.098	0.298	46
North America	Dummy: 1 = Northern American country; 0 = otherwise	0.137	0.344	64
South America [R1]	Dummy: 1 = Southern American; 0 = otherwise	0.072	0.260	34
Study characteristics				
Size area	Log of the size studied area	9.517	2.699	467
Choice Experiment	Dummy:1 = Choice Experiment methods; 0 = otherwise	0.064	0.245	30
Contingent Valuation	Dummy:1 = Contingent Valuation methods; 0 = otherwise	0.147	0.355	69
Other economic evaluation methods [R2]	Dummy:1 = Other methods; 0 = otherwise	0.376	0.485	176
Travel Cost	Dummy:1 = Travel Cost methods; 0 = otherwise	0.357	0.479	167
Value Transfer	Dummy:1 = Value Transfer method; 0 = otherwise	0.034	0.182	16
Realm/ES characteristics				
Fresch water	Dummy:1 = Fresch water ecosystem; 0 = otherwise	0.070	0.221	24
Marine [R3]	Dummy:1 = Marine ecosystem; 0 = otherwise	0.466	0.499	218
Terrestrial	Dummy:1 = Terrestrial ecosystem; 0 = otherwise	0.134	0.341	63
Transitional	Dummy:1 = Transitional ecosystem; 0 = otherwise	0.327	0.469	153
Tourist [R4]	Dummy:1 = if the ES is Tourism; 0 = if the ES is recreational	0.291	0.454	136
No protection [R5]	Dummy:1 = no protection; 0 = otherwise	0.338	0.473	158
Partially protected	Dummy:1 = Partially protected; 0 = otherwise	0.164	0.371	77
Protected	Dummy:1 = Protected; 0 = otherwise	0.496	0.500	232

[R]: *reference variables in the meta-regression model.*

Source: Author's elaboration

Table 2 showcases the variables incorporated into the meta-regression model. The dependent variable (y) represents a vector of US dollars per hectare per year, adjusted to the baseline price year of 2020. While, there are three categories of explanatory variables: socio-economic characteristics (x_{sec}), study characteristics (x_{sc}), and ESs or realm characteristics (x_{bc}).

The meta-regression model is a semi-log function as described in Equation 1:

$$\boldsymbol{log(y_i) = \alpha + \beta_{sec} x_{seci} + \beta_{sc} x_{sci} + \beta_{bc} x_{bci} + \varepsilon_i} \quad (1)$$

Where:

y: vector of US$ per hectare per year (with 2020 baseline price year);

x_{sec}: socio-economic characteristics of the country where the study was conducted;

x_{sc}: study characteristics (e.g. valuation method used);

x_{bc}: realm characteristics (e.g. type of investigated ecosystem);

α: constant term;

β: vector of the coefficients of the independent variables to be estimated;

ε: vector of independently and identically distributed residuals, and i represents the study.

4. Results and Discussions

Table 3 presents the estimated results of the inferential model. The adjusted R^2 reveals that the model explains almost 32 percent of the variation of the dependent variable. Furthermore, the Breusch-Pagan test (Chi^2=65.288; p-value=0.00) indicates that no heteroscedasticity is present in the estimated model.

As for socio-economic characteristics, different estimated coefficients have a statistically significant effect on the dependent variable. First, compared to the base case of *South America*, the value of ES for recreational and touristic opportunities is positively affected by the continent where the study was conducted: *Africa* (+), *Asia* (+), *Europe* (+), *North America* (+) and *Oceania* (+). A similar effect appear for the estimated *GDP* variable.

Among the study characteristics, the use of the *contingent valuation method* tends to have a negative impact on the depended variable compared to *other* methodologies.

In terms of the realm of the biome, *Transitional and Fresh water ecosystems* show a positive impact on the economic value estimated compared to the *Marine* realm. Contrasting results appear for the *Terrestrial* realm. In addition, a similar result is obtained by the *size areas*.

In addition, the presence of a protected area seems to have a positive effect on the estimated economic value of ES compared to the absence of any kind of (legal) protection. Finally, main results suggest that *touristic activities* tend to have a higher estimated economic value than that of *recreational activities*.

Table 3. Estimated results of the OLS model

	Coefficient	***Std. err***	***Prob.***
GDP per capita	**0.755**	**0.235**	**0.001**
Population density	-0.170	0.149	0.254
Africa	**2.888**	**0.814**	**0.000**
Asia	**2.532**	**0.561**	**0.000**
Europe	**2.896**	**0.509**	**0.000**
North America	**2.247**	**0.546**	**0.000**
Oceania	**2.769**	**0.842**	**0.000**
Size Area	**-0.393**	**0.052**	**0.000**
Choice Experiment	0.256	0.497	0.606
Contingent Valuation	**-1.631**	**0.354**	**0.000**
Travel Cost	-0.290	0.328	0.376
Value Transfer	-0.110	0.643	0.864
Terrestrial	**-0.683**	**0.402**	**0.090**
Fresch water	**1.380**	**0.537**	**0.002**
Transitional	**0.868**	**0.481**	**0.003**
Tourism	**1.575**	**0.282**	**0.000**
Partially protected	0.629	0.415	0.128
Protected	**0.586**	**0.318**	**0.066**
Constant	-1.702	2.714	0.539
No of observations	467		
R^2	0.348		
R2 adjusted	0.322		
Breusch-Pagan test (prob)	Chi2=65.288 (0.00)		

R1: is South American countries; R2: is other economic evaluation methods; R3: is marine ecosystems;
R4: is recreational ES; R5: is no protection.

Source: Authors elaboration

Differences also appear across realms. *Fresh water* and *Transitional* realms positively affect the economic value of the investigated ES, whereas the *Terrestrial* realm has a negative impact on the dependent variable with respect to the *Marine* realm. This outcome could stem from the increasing global interest in the sea, and its value since the publication of the '*2030 Agenda for sustainable development*' (United Nations, 2015). The European Commission and United Nations, for example, have recently emphasized their interest in the Blue Economy. This may have shifted the focus of the public opinion on the importance of marine systems to the detriment of terrestrial ones. A further relevant finding of the present study is the importance of protected areas in the assessment of the economic value of ES for recreational and touristic opportunities. We argue that these areas would guarantee habitat loss reduction and an efficient use of resources for biodiversity protection (Lindenmayer et al., 2006; Ortiz-Lozano et al., 2009; Panday et al., 2015). This result is also in line with the IUNC Program[5] (International Union for Conservation of Nature), stating about the efficiency of protected areas for increasing conservation and biodiversity protection.

5. Conclusion and future implications

This study presents a meta-regression analysis of scientific articles published between 1975 and

[5] https://www.iucn.org/our-work/topic/effective-protected-areas

2021, focusing on the economic valuation of ES for opportunity of recreational and tourism. Considering the significance of ES for the sustainable development of contemporary society the main aim of the present work provided an overview of the investigated issue.

Main findings underlined the existence of differences both at global scale and based on the degree of (legal) protection of the area under study. This led us to consider important insights to support the policy maker with an overview about people's perception of the value of ES for recreational and touristic opportunities. As a consequence, this bottom-up view would help the decision maker to develop ad-hoc policies (e.g. financial incentives to increase the number of protected areas) and tools based on the spatial location and realm characteristics of the area under study to improve the attractivity and opportunities of the investigated ES.

Also, in the context of the United Nation Decade of Ecosystem Restoration[6] the outcome of the present study may contribute to set up and develop restoration policies for the improvement of recreational and touristic ES, particularly in countries in which these ES values are low. Similarly, at European level the present study may contribute to achieve the aims of the Biodiversity Strategy for 2030[7], which it is part of the European Green Deal[8].

The present study is not without limitations. First, the investigation of cultural ES could have limited the number of studies included in the dataset. Generally, studies based on people's perceptions are expensive to deal with and *ad-hoc* econometric skills are needed to carry out inferential analyses.

Secondly, the ESVD database provides information about the quality of ES under study. Due to the limited number of studies dealing with the above information, the present work omitted the above studies to reduce biased estimates.

Finally, based on the heterogeneity in the geographical distribution of the analyzed studies, further research should focus on South America, Africa, Eastern Europe which are currently lacking of studies providing this type of investigation.

Conflict of interest

All authors declare no conflicts of interest in this paper.

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[6] https://www.decadeonrestoration.org/

[7] https://environment.ec.europa.eu/strategy/biodiversity-strategy-2030_en

[8] https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal_en

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