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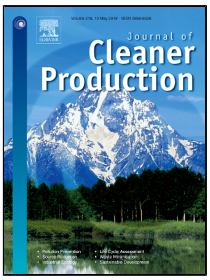

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PII:	S0959-6526(19)30976-X
DOI:	10.1016/j.jclepro.2019.03.266
Reference:	JCLP 16270
To appear in:	*Journal of Cleaner Production*
Received Date:	24 September 2018
Accepted Date:	24 March 2019

Please cite this article as: Simona Bigerna, Silvia Micheli, Paolo Polinori, Willingness to Pay for Electric Boats in a Protected Area in Italy: A Sustainable Tourism Perspective, *Journal of Cleaner Production* (2019), doi: 10.1016/j.jclepro.2019.03.266

Willingness to Pay for Electric Boats in a Protected Area in Italy: A Sustainable Tourism Perspective

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Abstract

The relationship between tourism development and environmental degradation is one of the policy agenda for sustainable tourism. Tourism in protected areas is a complex phenomenon, which brings both positive and negative effects on the environment and local communities. The transition toward forms of sustainable mobility, such as electric boats, allows to reconcile tourist activities with preservation of protected areas, strengthening the links between land use and transport. The aim of this paper has been the investigation tourists' preferences to elicit their willingness to pay for the introduction of electric boat fleet in the Regional Park of Trasimeno Lake, a protected area in Italy, in order to reduce CO2 emissions. Data were collected by means of questionnaires. The impact of uncertainty on contingent valuation responses using three different approaches has been used. Also the effects of pricing CO2 emissions from boating activities have been investigated. The research results show that variables such as sex, age and visits' duration of stay have an impact on the respondents' willingness to pay and the related uncertainty. Considering two electrification options of the fleet, simulation results indicate that both price premiums and a subsidy policy are needed for electric boats deployment. This paper showed the need for public and private authorities to implement instruments including an important role for education to achieve a new tourism model based on natural features and sustainability.

Keywords: tourists' preferences; sustainable mobility; respondent uncertainty; contingent valuation; electric boats; protected area.

Word count: 7732

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Keywords: tourists' preferences; sustainable mobility; respondent uncertainty; contingent valuation; electric boats; protected area.

1. Introduction and theoretical background

There has been a growing interest in the relationship among tourism, transport and environment over the last few years (Blancas et al., 2018; Mihalic, 2016). As shown in some empirical studies, tourist travel may involve adverse environmental effects, increasing pollution, and threating natural resources and physical environment (Wang et al., 2019; Azam et al., 2018; Høyer, 2000). The attention towards transport problems in the tourism sector underpins sustainable tourism, a concept referring to a tourism which is ecologically benign, economically feasible and socially acceptable (UNEP and UNWTO, 2005). It is widely acknowledged that natural resource conservation and energy usage efficiency are crucial for the financial viability and environmental sustainability of the tourism industry (Stylos et al., 2018).

Considering the tourism's impacts on the environmental quality of inland lakes, the main effects are exerted by boating (Hall and Härkönen, 2006; Asplund, 2000). Particularly, boating on lakes may have global impacts (CO2 emissions) and local impacts (physical and chemical)[1]. In this context, electric boats[2] (EB) are meant to play an important role as a sustainable transport mode, and as a key driver for sustainable tourism in protected areas. EB are part of the technological research agenda of the main tourism stakeholders and policy makers, attempting to reduce the negative impact of the current motor boats equipped with traditional propulsion systems (Del Pizzo et al., 2010). EB are a promising technology, being able to reduce CO2 emissions up to 50% (Łebkowski, 2017; Karimpour

[1] Physical impacts due to power boating activity are waves, which may cause bank erosion, turbidity, which affect shallow lakes and results in disturbance of bottom sediments, and noise and visual disturbance. Chemical impacts include fuel leakage and emissions due to a large extent to the inefficient mode of operation of engines, resulting in water pollution.

[2] In this paper, EB refer to hybrid electric boat driven by an electric motor and a diesel engine.

and Karimpour, 2016). However, the related high costs and the technology, which is still under developed, lead to many uncertainties with respect to several issues (Bianucci et al., 2015).

Also, the transition toward forms of mobility that are sustainable is perceived as a risky task because the effects of mitigation transport policies at the local level on future tourist demand are still unknown (Scuttari et al., 2018). Among the relevant stakeholders involved in sustainable tourism, the role of tourists, being the main actors of the tourism industry, is crucial for contributing to environmental improvements. Destinations seeking a more sustainable business model strongly rely on tourists' willingness to pay (WTP) as an economic instrument for sustainable tourism management, to investigate the effort tourists are willing to make in order to improve their behavior (Platania and Rizzo, 2018). Generally, researchers studying WTP in the tourism sector for the quality of environmental attributes find that tourists with high level of knowledge, attitude, and those from countries with high energy awareness show they are more willing to select and pay for eco-efficiency in tourist operations (Ramdas and Mohamed, 2014; Tsagarakis et al., 2011; Hearne and Salinas, 2002). However, very few authors have empirically examined the tourists WTP for mitigating their impacts on the environmental quality of protected areas.

This paper aimed to investigate tourists' preferences to elicit their WTP for the introduction of EB in the Regional Park of Trasimeno Lake, a protected area in Italy. In the usage of the local public transport system in the Trasimeno Lake, residents represented an extremely low number compared to tourists, consequently their preferences were extremely important. The WTP for EB has been investigated in order to mitigate the global environmental impacts of CO2 emissions of the current conventional boats. Besides, it has been explored whether pricing CO2 emissions from boating activities would exert positive effects for the replacement of the existing fleet with EB in Trasimeno Lake.

Findings from the few studies on WTP for environmental goods and services in protected areas show that the WTP is strongly related to the education level, place of residence, and general views about

natural heritage (Patti, 2018; Petrosillo et al., 2007). Although individuals show environmental concerns, it is less likely they avoid high polluting forms of transport when they go on holidays (Barr and Prillwitz, 2014).

So far, there are no studies evaluating an economic measure of the global externalities in lakes from tourists' activity. This study fills an existing research gap, providing a quantitative basis to measure the effects of such externalities in lakes. Given the economic, social and cultural importance of tourism, all this information is relevant for tourism stakeholders and policy makers to manage in a sustainable way the natural and man-made landscapes in protected areas.

The reminder of the paper is structured as follows. Section 2 presents the methods and data. Section 3 reports the results and discussion. As the conclusion, Section 4 summarizes the research and proposes policy implications.

2. Methods and data

The study has been conducted in the Trasimeno Lake, an area of high naturalistic, historical and artistic value, which is part of the protected area of the Trasimeno Regional Park located in the Umbria Region. Trasimeno Lake is a shallow lake; it is the largest lake in central Italy and fourth among Italian lakes, with 128 km^2. The surface of the park involves five municipalities. There are three islands on Trasimeno Lake, i.e., Isola Polvese, Isola Maggiore, and Isola Minore. In the period 2015 – 2017, almost 700,000 tourists have visited the Trasimeno area, for a total of more than 2.5 million of visitor nights. On average there are more than 200,000 tourist numbers yearly, (10% of the total regional number of tourists), this means that Trasimeno Lake is the third tourist location in Umbria after Assisi and Perugia destinations. In 2016 (the year of the survey), Trasimeno Lake had 250,000 tourists against 47,000 residents, and on average 80% of tourists has used passengers' boats. In the Trasimeno Lake there is only one Transport Company for the public service that ensures regular connections between the mainland and the islands, both to the Isola Polvese and the Isola Maggiore.

From the mainland to the "Isola Maggiore" there are, on average, 12 trips a day, while from the mainland to the "Isola Polvese" there are nine trips a day. A fleet of eight traditional diesel boats guarantees these trips. Isola Minore is private and it cannot be visited (Figure 1).

Figure 1: Routes on Trasimeno Lake

2.1 Survey design and questionnaire

The data analyzed in this paper comes from a survey made in the Regional Park of Trasimeno Lake. The survey was designed to study preferences regarding sustainable mobility. According to the state preference methods, the core of the questionnaire was contingent valuation (CV) concerning the introduction of EB in the local public transport system in the Trasimeno Lake to reduce both CO2 emissions and others externalities. The CV is considered a valid and useful method to find out how people value goods and services for which no market exists, such as some environmental resources (McFadden and Train, 2017). The CV method has been used extensively as a basis for policy decisions, including projects related to the protection of open access resources and natural parks (Cook et al., 2018). In this paper, the issue of respondents' uncertainty[3] has been explicitly taken into

[3] Respondents' uncertainty is one of the main sources of bias in CV studies (Ready et al. 2010). However, among other causes, social desirability also generates bias, as identified in many CV studies (see, among others

account to overcome many of the perceived weaknesses of the CV, such as bias in survey instrument that may influence respondent behavior and response (Hausman, 2012). Thus, respondents have been asked to state their WTP a higher ticket price expressed as percentage increase of the price itself. In June 2016, pilot surveys to ascertain the appropriateness of exponential response scale have been implemented to test the questionnaires (Rowe et al., 1996)[4]. Pre-results provided 17 bids with increases in the range between 0% and 150% with respect to the current ticket price for navigation of 6.50€. The respondents were picked randomly among users who were waiting to board for the Trasimeno Lake. The questionnaire was administered face-to-face from July to September 2016, for a total of 263 usable questionnaires. The interviews that have been conducted covered people from both different regions in Italy, and some European Union countries. The questionnaire included five parts. In the first part, respondents were first asked about their attributes such as demographic characteristics, age, and place of origin. The second part of the questionnaire included respondents' perception and behavior towards environment and cultural resources. Respondents, using a 5-point scale, from 1 (nothing) to 5 (very much), were asked about their satisfaction with respect to the lake services, and to what extent they are familiar with the term sustainability. In this way, it is possible to detect their comprehension about the valuation scenario and how they are indirectly affected by the environmental change subject to valuation (Bigerna and Polinori, 2014). Besides, to indirectly detect respondents' willingness to mitigate their impact on Trasimeno Lake, tourists have been asked,

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Lee and Sargeant, 2011, Milfont, 2009). In the survey of this paper, interviewers have explained to respondents, and assured them, that there were no "right" or "wrong" answers. This helped respondents to know that any kind of response was perfectly and socially acceptable.

[4] Preliminary surveys and focus groups are useful in determining the degree of familiarity respondents have with a specific good, and also with substitute and complementary goods perceived as relevant by respondents. Besides, pre-testing allows to check for communication problems. Pre-test survey has involved 90 respondents; the amounts proposed are based on the results from the open-ended WTP question.

for example, to state their willingness to limit access to the lake to protect environmental features. The third part of the questionnaire explored the transportation mode respondents use most frequently, the interest for vehicle that use alternative energy sources and whether or not they are likely to buy them. The fourth part of the questionnaire aimed to highlight respondents' knowledge about the European policy to improve sustainability in the transport sector, and the type of ticket they use for transport in the Lake. The fifth part of the questionnaire elicited respondents' WTP (bids) a higher price to contribute to buy an EB in Trasimeno Lake. Higher price was expressed as a percentage of the ticket, to support the adoption of EB in Trasimeno Lake. In this regard, the question respondents have considered is[5]:

> *It would be necessary to implement new actions to decrease pollution in the Trasimeno Lake. If you were to contribute to the purchase of an EB could you pick the maximum % (as a % of the ticket) from those listed below that you would be willing to pay? (Option 1). If you cannot state a single %, could you indicate a range that describes how much you would be willing to pay? (as a % of the ticket) (Option 2)*

Uncertainty in the elicitation format has been introduced to overcome criticism of the validity of CV method for goods and services, according to which stated WTP might be a poor indicator of actual WTP due to bias or changes in consumers' values or circumstances (Whitehead et al., 2008;

[5] The reported demand is included in a more general contingent scenario used to assess a financial measure of the project proposed to respondents (see Section 3.3). Within the contingent scenario, it has been taken into account the size of the fleet and several types of fuel. In detail, the main characteristics of both diesel and hybrid boats have been described, highlighting their main environmental impacts when they are used for ensure the connections between the two islands and the mainland. Finally, a realistic and credible payment vehicle has been adopted, proposing the most frequently ticket used, the round trip type.

Onwujekwe et al., 2005). A modified payment card method (Voltaire et al., 2013) has been used, thus allowing respondents to choose jointly WTP and degree of certainty (Figure 2).

Figure 2: Elicitation Format

Lower % (Bid')	Upper % (Bid^o)
□ 0	□ 0
□ 1	□ 1
□ 2	□ 2
□ 5	□ 5
□ 10	□ 10
□ 15	□ 15
□ 20	□ 20
□ 25	□ 25
□ 30	□ 30
□ 35	□ 35
□ 40	□ 40
□ 45	□ 45
□ 50	□ 50
□ 60	□ 60
□ 80	□ 80
□ 100	□ 100
□ 150	□ 150
□ other	□ other

Source: Voltaire et al. (2013), modified.

2.2 Theoretical and econometric method

In this study, a new scenario has been proposed to respondents in order to elicit their WTP to support the project and their relative favor to the investment project. As with any CV-application, there exist a risk of incurring in biased results, and no widely accepted methodology exists to control for hypothetical bias. However, according to the literature, a well-designed and carefully administered survey can provide quite consistent, coherent and credible information on welfare changes estimates. Loomis (2011) suggested that a deep comprehension of the way preferences are constructed allows exploring the factors influencing the magnitude of hypothetical bias and how to mitigate it. It has been assumed that the total utility (U) of respondent is a function of the indirect utility (v) depending on the income (I), and on the environmental quality (A), where p is the price vector.

$$U = v(p, I, A). \quad (1)$$

Respondents who express a positive attitude towards the project attach greater importance to A. The realization of the project improves environmental quality, $A^1 > A^0$, and the respondent will be willing to contribute to the project:

$$v(p^0, A^0, I) = v(p^0, A^1, I - WTP) \quad (2)$$

Economic values elicited by stated preferences methods can differ from actual values given that the hypothetical nature of the questions can lead to bias responses, weakening the findings (Mitchell and Carson, 1989).

Recent improvements in the empirical methodology showed that the bias between actual and hypothetical values can be reduced (Loomis, 2014; 2011), tackling the respondents' uncertainty. The experiment addressed respondents' uncertainty in CV method, testing if respondents had a specific value or a range values for an environmental service.

Respondents were asked to choose between: i) a range of values (with increasing uncertainty) or; ii) a punctual value to be added to the good under evaluation (without uncertainty in the respondents' choice). Indeed, with most of the EB as prototypes, potential end-users were less confident in this new technology. This suggested that it was crucial to control for uncertainty in the empirical estimations.

Using the modified payment card method proposed by Voltaire et al. (2013), the degree of uncertainty (UN) has been computed from bid responses as follows:

$$UN=(Bid' – Bid°)/Bid'. \quad (3)$$

The assumption was that Bid° is equal to the amount respondents would pay for sure, and Bid' is the highest amount respondents are still willing to pay[6]. However, other features in addition to income could affect the estimated WTP, such as the related riskiness perception and the private characteristics of respondents. To deal with uncertainty, three different approaches have been used.

In the first approach (A), a Seemingly Unrelated Regression – SUR estimator (Zellner, 1962) was used to take into account the interaction between WTP and uncertainty. WTP was then estimated using an independent equation weighting the well-being measure jointly regressed with an uncertainty measure, obtained through equation (3), highlighting the existing correlation among errors. Formally:

$$y_{ja}(WTP) = X_{ja}\beta_{ja} + \varepsilon_{ja} \quad (4a)$$

$$y_{jb}(UN) = X_{jb}\beta_{jb} + \varepsilon_{jb} \quad (4b)$$

Using equations (4a) and (4b), it was possible to estimate more precise parameters in a more efficient way (Riddel and Loomis, 1998; Park and Loomis, 1996). The matrix X of the explanatory variables represented individual and family characteristics for the respondents' j, while β was the relevant parameters vector of each equation and ε is the vector of the error.

[6] According to Voltaire et al. (2013), if a respondent freely chooses an interval that ranges from Bid° to Bid' this means that the stated lower bound should logically be not higher than the actual WTP. Then, (ibidem, p. 78): *"it can be reasonably assumed that the individual would certainly pay the amount stated as the lower bound of his range of WTP"*. Thus, it is plausible to assume that actual WTP should not exceed stated upper bound.

Through this approach, it was possible to integrate behavioral and perceptual features[7] in a purely economic framework, taking jointly into account WTP and uncertainty associated to the stated WTP. Another approach (B) to take into account uncertainty was to estimate an ordinary least squares (OLS) model using an adjusted bid (adjBid):

$$adjBid = Bid' - [(Bid' - Bid^{o})*UN] \quad (5)$$

Finally, the benchmark was an interval regression approach (C) estimated using unweighted bids' interval [Bid'- Bid^{o}]. With this approach, exact responses - Bid^{Exact} - (13%) have been converted in an interval, according to Welsh and Poe (1998):

$$Bid^{o} = Bid^{Exact} - 0.001 \text{ and } Bid' = Bid^{Exact} + 0.001 \quad (6)$$

3. Results and discussion

3.1 Descriptive results

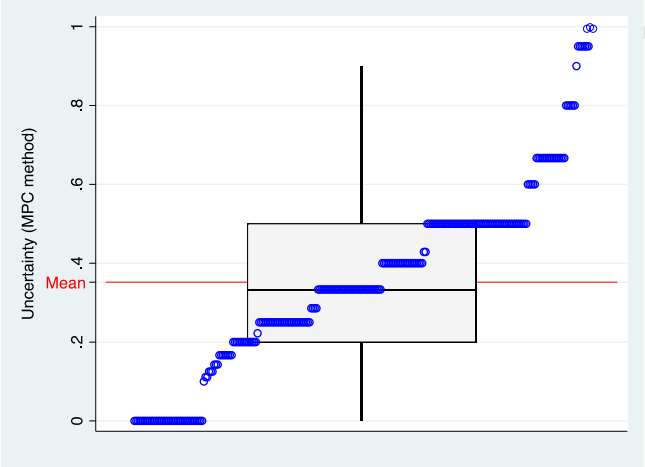
This section analyzed to what extent respondents were willing to pay for EB in Trasimeno Lake, which is part of a protected area in Italy. Initially, relevant descriptive results on uncertainty have been presented; this was crucial for improving the estimation of the WTP.

[7] Several authors (see, among others Johnson and Slovic, 1995) have underlined that people are unfamiliar both with uncertainty and probability concepts, even if they are introduced in a graphical way; thus, risk perception is an arduous topic to evaluate in an explicit way. The proposed elicitation format and regression technique allow to directly incorporate behavioral and perceptual features into the choice made by the respondent, reducing the risk measure problem. Nevertheless, if risk can be consistently defined and measured, SUR approach allows to jointly take into account welfare measures and risk perceptions associated to the externalities assessed in the contingent framework (Bigerna and Polinori, 2019; Mozumder et al., 2009).

Second, conditional mean and median WTP estimated have been obtained according to different econometric techniques; so far, other studies have assessed the economic values of global externalities in lake from navigation activities.

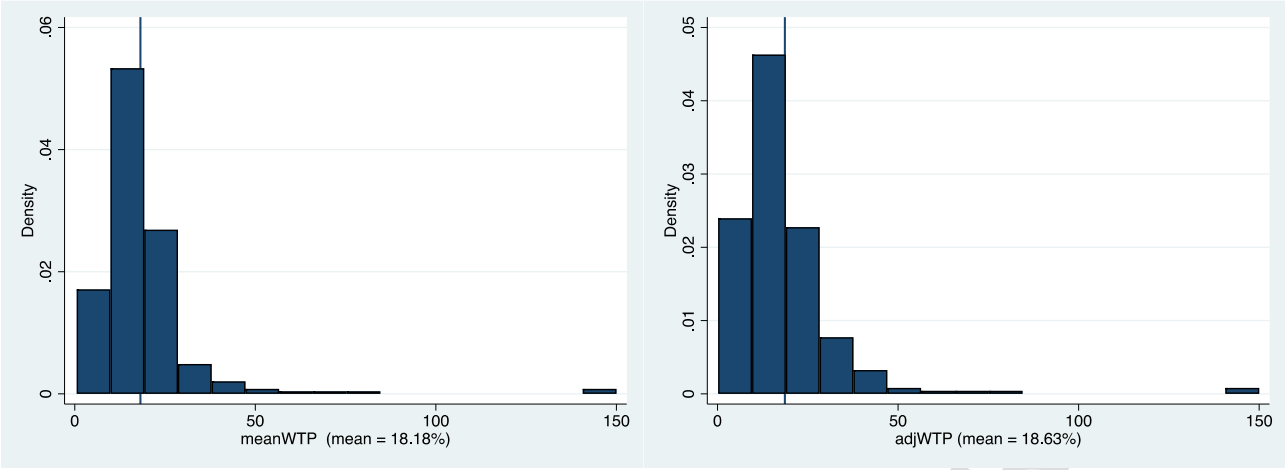
Focusing on uncertainty, it turned out that respondents absolutely certain about their responses were 15.2% while respondents that had uncertainty higher than 90% were 2.7%. (Mean = 0.3502; Q50 = 0.3333), as shown in Figure 3, while elicited WTPs have been shown in Figure 4.

Figure 3: Uncertainty of WTPs' Distributions



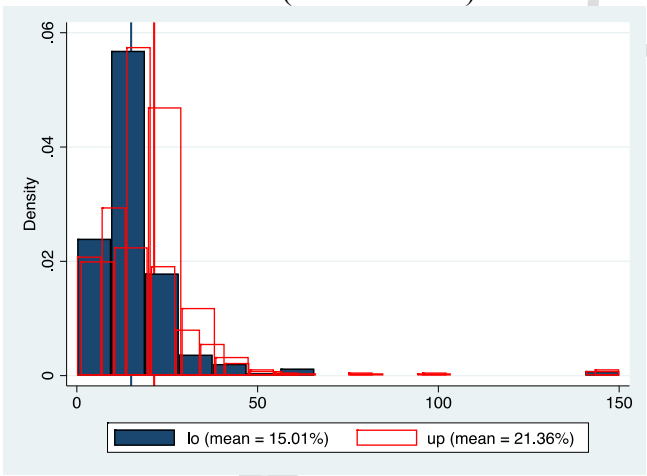
The mean WTP (Panel A) was equal to 18.18% (1.18€) while the adjusted measure was equal to 18.36%. In the interval approach, the averages were equal to 15.01% and 21.36% for lower and upper bound respectively. The distributions showed in Figure 4 were truncated in that there was no zero WTP. Zeros represent an important drawback of an open-ended format. However, given that respondents were highly involved in the aim of this research, a low number of zero responses had been provided.

Figure 4: WTP Density Distributions According to the Approaches Used
(*Vertical solid lines show mean values*)
Panel A (mean WTP)



Panel B (adjusted WTP)

Panel C (interval WTP)



Therefore, removing the zeros did not bias the sample because of the small percentage of zero WTP obtained (8.7%). In detail, 25 respondents had stated zero WTP, and protest votes had been 84% (Table 1).

Table 2 described variables used in the econometric analysis. According to the three approaches implemented in this paper, three LHSs' variables have been provided in the Panel I. On average, bids elicited were around 18.2% (that is 1.18€), while lower and upper bid means were 15% and 21.4%, respectively.

RHSs' variables were provided in Panel II. The representative respondent was an Italian, no local, tourist, male, 41 years old, with medium-high income.

Table 1: Arguments for Expressing Zero Maximum WTP for the Project

Responses	#	%
I cannot afford it	4	16%
Others should pay	0	0%
The current ticket price is already expansive	0	0%
The payment vehicle is inappropriate	0	0%
I don't agree to pay an extra-fee to preserve the environment	9	36%
I don't have faith in the Company that will undertake to invest in the project	3	12%
I don't regard the transportation environmental consequences on the area as important ones and thus proposed project is not needed	9	36%
I have too little information about the project	0	0%
Others	0	0%
Total	25	100%

Table 2: Descriptive Statistics (263 Observations)

Variables	Mean	Std. Dev.	Min	Max
Panel I: LHS				
Approach A				
meanBid	18.18	15.49	0.55	150.00
UNBid	0.35	0.23	0.00	0.95
Approach B				
adjBid	18.63	15.94	0.19	150.00
Approach C				
Bid^{o}	15.01	15.43	0.10	150.00
Bid'	21.36	15.86	1.00	150.00
Panel II: RHS				
Sex of respondent (1 if male)	0.52	0.50	0	1
Age of respondent	41.00	14.99	19	78
log (income) of respondent	7.39	0.41	5.99	8.41
Residents (1 if respondent is resident in the Park)	0.14	0.25	0	1
Local (1 if respondent is a local tourist)	0.23	0.42	0	1
Foreign (1 if respondent is a foreign)	0.26	0.24	0	1
First visit (1 if the respondent is a first-time tourist)	0.30	0.40	0	1
Long visit (1 if the length of stay is longer than 3 days)	0.22	0.37	0	1
Second house (1 if the respondent stays in his own second house)	0.11	0.32	0	1
Relative-friends (1 the respondent stays with relatives and friends)	0.04	0.18	0	1
Commercial (1 if the respondent stays in commercial accommodation)	0.25	0.43	0	1
Natural (1 if the respondent visits natural sites during the stay)	0.48	0.50	0	1
Cultural (1 if the respondent visits cultural sites during the stay)	0.29	0.46	0	1
Sport (1 if the respondent takes part to sport activity during the stay)	0.11	0.31	0	1

He was not a first-time tourist and he was on holiday without relatives and friends. He was hosted outside the Regional Park and his preferences mainly referred to naturalistic features of the area.

3.2 Econometric results

Econometric results were presented in Table 3 according to the three approaches used to appraise WTP. Among the approaches used in the paper, the first one, which jointly estimates the WTP and uncertainty, provides estimates that are more precise. Furthermore, it takes into account correlation across equations, providing both best WTP inferences and efficiency gains in estimating parameters. These results are in line with CV literature (see among others Riddel and Loomis 1998; Park and Loomis, 1996)

Table 3: Econometric Analysis

Variables	MeanWTP[a]		UnWTP[a]		AdjWTP[b]		Interval WTP[c]	
Sex	-3.8924	**	0.0850	***	-4.4871	***	-1.6884	*
	1.6222		*0.0230*		*1.6741*		*1.0416*	
Age	0.1189	**	0.0032	***	0.1091	*	0.0539	**
	0.0547		*0.0008*		*0.0600*		*0.0308*	
log (income)	15.3487	***	-0.1419	***	14.7527	***	13.5552	***
	2.3309		*0.0330*		*2.5394*		*1.5773*	
Educ	4.4892	***	-0.0938	***	4.2721	**	3.4956	***
	1.5283		*0.0216*		*1.6708*		*1.0419*	
Residents	3.0346		0.0755		3.1969		5.4809	
	13.2142		*0.1870*		*13.6313*		*7.0952*	
Local	7.9859	***	-0.0778	**	7.4107	***	8.5650	***
	2.1695		*0.0307*		*2.2858*		*1.4306*	
Foreign	-9.0049	**	0.0761	*	-8.0006	*	-6.0019	**
	4.2810		*0.0426*		*4.4810*		*2.7882*	
First visit	0.5251	*	-0.1017	***	0.2561	*	1.4565	*
	0.2939		*0.0365*		*3.2299*		*0.8101*	
Long visit	1.0256		-0.1148	***	0.9970		0.4093	
	2.9584		*0.0419*		*3.0913*		*1.9098*	
Second house	-0.1492		-0.0476		0.1247		-2.5142	
	13.0558		*0.1848*		*13.4595*		*6.8711*	
Relative-friends	-1.7792		-0.1411		-1.6468		-3.2522	
	13.9507		*0.1974*		*14.3808*		*7.6592*	
Commercial	-0.6982		-0.0148		-1.9329		-6.4528	
	13.6983		*0.1939*		*13.9694*		*7.1679*	
Natural	0.9528	*	0.0106	*	0.2518	*	0.3835	*
	0.5294		*0.0059*		*0.1410*		*0.2136*	
Cultural	1.9091		0.0524		2.9398		2.0237	
	1.9872		*0.0281*		*2.0809*		*1.3061*	
Sport	2.8079		0.0584		1.2874		0.3914	
	2.7863		*0.0394*		*2.8482*		*1.7755*	
Cons	-109.7612	***	1.4274	***	-102.6176	***	-94.5482	***
	16.6259		*0.2353*		*16.9360*		*10.6040*	
Observations	263		263		263		263[d]	
Parameters	15		15		15		15	
Root MSE	12.700		0.180		13.295		--	
R-sq	0.325		0.381		0.344		--	

Adj R-sq	--	--	0.304	0.324
Chi-sq$_{15}$ (Prob)	126.69 (0.00)	161.54 (0.00)	--	223.31 (0.00)
$F_{14\text{-}243}$ (Prob)	--	--	9.18 (0.00)	--
LL	--	--	--	-1231.675
E[WTP]	16.97%		18.51%	15.68%
median WTP	11.26%		10.01%	11.45%

[a] Approach A: SUR estimation (Eq. 4a,b). [b] Approach B: OLS estimation. [c] Approach C: IR estimation.
[d] 20 uncensored observations; 243 interval observations. Standard errors are in *Italic*. ***, **, and * indicate statistically significant at the 1%, 5% and 10%, respectively

Estimated WTP referred to a set of explanatory variables related to socio-economic aspects and visit characteristics. In the first approach, conditional WTP and the related uncertainty have been jointly estimated, finding a common core of significant variables that are Sex, Age, Income, Education, Foreign, Local, First visit and Natural. These variables affected both conditional WTP and the related uncertainty. In detail, males were willing to support less the EB projects and they were affected by more uncertainty than females. The same results characterized older respondents, while the high-Income level respondents showed lower degree of uncertainty linked to a higher WTP. In addition, high Education level lowered uncertainty, meaning that Education enhanced the understanding of sustainable mobility, thus was supporting it. The same behavior characterized local and first visit tourists, while foreign were willing to support less the project, and their WTPs were affected by higher uncertainty. In addition, long-time visitors showed lower degree of uncertainty due to their well-defined preferences and higher motivation. Finally, respondents who visited natural sites during the stay provided a higher WTP due to a higher uncertainty. The parameters for significant socio-economic characteristics that affected WTP did not change, i.e., remained coherent in term of signs, with the first Approach (A) and no other parameters become significant in the Approaches (B) and (C). These results supported the robustness of the empirical strategy implemented in this paper. As it has occurred in the estimation of uncertainty, also in this case a common set of variable explained respondents' WTP in all the three approaches used. In details, female respondents exhibited a lower WTP according to their lower income. Older and high-Income level respondents showed higher WTP

such as higher educated respondents. The WTP was also related to the type of visit, indeed long-time visitors showed a higher WTP such as local tourist, while foreigners exhibited a lower WTP.

The results of this study have been compared with previous studies focusing on tourists' WTP for environmental protection in protected areas and natural parks and for minimizing tourism impact. Regarding the positive influence of income on WTP amounts offered, results were in line with some research (Lal et al., 2017; Bergstrom et al., 2004), and contrasted some other, according to which, visitor and visit characteristics were not significant determinants of visitor responses to the payment principle question (Togridou et al., 2006; Mathieu et al., 2003). Compared with Patti (2018), the same results of this study occurred in terms of older respondents and those with high education level, more willing to support for environmental protection, while differed in terms of male and female respondents, with female respondents exhibiting a lower WTP.

Besides, this study confirmed what has emerged from the literature, where educational levels were also significant predictors of the tourists' WTP (Bravo-Vargas et al., 2019; Cheng and Wu, 2015), suggesting that structured education programs could produce changes in tourists' behavior.

Table 4 gave, for each approach implemented, the mean and the median[8] values of the WTP a higher ticket price for the introduction of EB in the Trasimeno Lake in order to reduce CO2 emissions. Referring to the mean values, estimations showed that users were always willing to pay price premiums on the ticket price of the public transport system. The WTP amounted to 1.16€ in approach

[8] As highlighted by a reviewer, if a respondent did not intend to use EB, he might be strategic in his responses by stating a high WTP. Even if, there would be no financial consequences to his responses (as he would never face the new ticket price), this would presumably increase the chance that the project was implemented. In order to take into account this possible strategic behavior first, the degree of WTPs' certainty has asked to respondents; second median WTP has computed given that it is a robust welfare measure. In this way, it is possible to reduce the effect of the strategic responses.

A, 1.27€ in approach B, which was the highest value, 1.07€ in approach C. Thus, given the current ticket price of 6.50€[9], users would have paid 8.01€, 8.12€, 7.92€ for the navigation service.

Table 4: Conditional Mean and Median WTP Estimated According to Different Approaches

Statistics	Approach A	Approach B	Approach C
Individual estimated WTP			
mean WTP	16.97%	18.51%	15.68%
median WTP	11.26%	10.01%	11.45%
Increase of ticket prices (€)			
mean	1.16	1.27	1.07
median	0.77	0.69	0.78
New ticket prices (€)			
mean	8.01	8.12	7.92
median	7.62	7.54	7.63
Total annual WTP (€)			
lower bound (# of households)			
mean	528,660.00	535,920.00	522,720.00
median	251,467.62	248,827.54	251,797.63
upper bound (# of tourists)			
mean	1,602,000.00	1,624,000.00	1,584,000.00
median	762,007.62	754,007.54	763,007.63

Results obtained from the three approaches were quite similar, being in a range of 0.20€. Taking into account the median values, which divided the cumulative distribution function in half, thus representing, in a referendum interpretation, the maximum amount that the majority of users were willing to pay (Blamey et al., 1995), the highest value occurred implementing approach C, with a

[9] The current ticket price for navigation refers to a round-trip cost. It is assumed that tourists visit Trasimeno Regional Park once a year, and that they use the boat in Trasimeno Lake only once. This conservative assumption is in line with the approach implemented in this research and it represents a minimal level of contribution by users. The available information does not allow for a more accurate calculation, as suggested by the anonymous reviewer. Indeed, data available shows only that, on average, tourists' length of stay is longer than 3 days, and 30% of the sample are first-time tourists. With reference to the remaining part of the sample, it is not possible to detect how many times they have visited the lake earlier or how many times they will visit it in the coming years. Besides, relatives and friends host 4% of the sample, but the frequency of visits is unknown.

price premium of 0.78€ (new ticket price 7.63€), followed by approach A with 0.77€ (new ticket price 7.62€), and approach B (new ticket price 7.54€).

To obtain more robust results, individual welfare measures have been aggregated using two types of information. The problem of missing statistics on age of tourists that have visited the Trasimeno Regional Park has been bypassed using, as lower limit, the number of tourists' households (66,000), and, as upper limit, the number of tourist (200,000). When estimating the total annual WTP, no variations in the number of tourists using this public transport service have been taken into account, given the users' inelastic demand for the navigation service, also related to the presence of only one public transport company within the Trasimeno Lake. According to the two aggregation hypotheses, the upper mean values of the total annual WTP amount ranged from 1,584,000.00€ (approach C) to 1,624,000.00€ (approach B), and the upper median values ranged from 754,007.54€ (approach B) to 763,007.63€ (approach C). Considering the lower "values" associated to the yearly number of tourists' households, the aggregate mean WTP lied between 522,720€ (approach C) and 535,920€ (approach B). Median's values were obviously smaller, ranging from 248,827€ (approach B) to 251,797€ (approach C). In the next section, only medians WTP were used due to median higher robustness, so that a more reliable and conservative approach has been adopted.

3.3 Some insights on the EB project in Trasimeno Lake

Lake tourism, which is strongly integrated in the territory, is playing an important role in recreation and holidays in Italy. Lake tourism is concentrated mainly in three regions of northern Italy, with almost 86% of tourists' presences (Veneto, Lombardy, Trentino Alto Adige), while considering the other Italian regions, only Lake Trasimeno in Umbria is relevant in terms of tourists' presences.

In Umbria, a region known as Italy's "green heart", tourism's promotion is based on harmony between tourists' activities and the environment, and the integration with the cultural and identity

resources[10]. To manage protected areas, Italian regional parks receive public funds at regional and national levels, but regional natural parks have suffered strong reduction for management during the last years. Sustainable tourism is an opportunity for tourism development and environmental protection of regional natural parks.

Policy makers around the globe have recognized the public value[11] that could be created with electric mobility (Bodde and Sun, 2016). Focusing on EB, there is a growing industrial interest to spur the advances in technology in this sector, reaching some results[12].

For instance, referring to Venice, where canal routes throughout the lagoon city are used for transporting both tourists and the local population, the public transport company has introduced a small hybrid EB[13]. In Lake Lucerne, the fourth largest lake in Switzerland, the Lake Lucerne

[10] These characteristics, for instance, have been promoted by Sensational Umbria, a photography exhibition by Steve McCurry, held in Perugia in 2014-15, thus highlighting the relationships among landscape, arts and tradition, i.e., manmade landscape.

[11] In recent years, concerns about the negative effects of air pollution and rising oil prices have motivated governments to demand the transport industry green and more fuel-efficient vehicles (Dijk et al., 2013). Most of the research programs have been aimed at developing hybrid and electric road vehicles, with Toyota and Honda as major investors among carmakers in such technologies.

[12] Some studies highlight the importance of stimulating the development of EB for clean mobility (Astiaso Garcia et al., 2015; Trip and Konings, 2014). Most of the literature investigates the feasibility of moving the diesel-based boat technology used for tourist transportation to EB, designing and constructing one or more prototypes EB for public transport, in relation to the available funds (Chanashetty and Patil, 2015; Morandin et al., 2015). Bianucci et al. (2015) illustrate the barriers to large-scale deployment of EB in terms of high cost and reduced capacity of the energy storage systems currently available, highlighting the good performances of EB in specific cases, as it is the case of lakes with route-well defined and low speed navigation.

[13] Such small hybrid EB is able to travel along the local public transportation route in the historic center of Venice, and away from the center by recharging batteries with a generator during the journey.

Navigation Company on May 2017 has introduced a hybrid EB with a capacity of 400 banquet seats. The Fjords Company, which currently operates a hybrid vessel, has launched in April 2018 a full EB able to carry up to 400 passengers.

The experiment of this research investigated price premium users were willing to pay as a financing option for replacing the current conventional boats with EB in the Trasimeno Lake. To this aim, two different technologies have been considered. The first one referred to hybrid EB, which combine an electric motor with a combustion engine. The second one referred to full EB, a boat technology developed to be even more eco-friendly than hybrid EB, with an entire electric propulsion system. Besides, the amount of the annual WTP necessary to achieve 100%, 50%, and 25% ferry fleet (consisting of eight boats) replacement in Trasimeno Lake has been estimated. The estimations were obtained according to the three approaches (Table 5).

According to estimations, the upper bound median WTP of users in Trasimeno Lake was able to fully cover the purchasing price of hybrid EB according to the three approaches implemented, i.e., 108.9%, 107.7%, and 109%, respectively. In the case of full EB, clearly the degree of coverage of the purchase price through the consumers' WTP decreased sharply, i.e., 38.1%, 37.7%, 38.2%, due to the higher purchase price of the upgrade full EB technology. Taking into account the lower bound median values, the users' WTP would have covered 35.9%, 35.6% and 36% of the purchase price of hybrid EB, according to the three approaches implemented. The percentages decreased when considering full EB, with 12.6% (Approach A), 12.4% (Approach B), 12.6% (Approach C).

Results have highlighted the importance of designing subsidies, both at the national and local levels, in policy programs, which, together with the price premium users are willing to pay, may encourage ferry operators to convert from conventional boats to EB.

Table 5: Financing Options and Years Required[(a)] to Replace Ferries

Type of Boat		Passengers	Price (€)
Hybrid EB (Hybr EB)		40	700,000
Full electric EB (Full EB)		150	2,000,000
Estimated annual median WTP (€)	Approach A	Approach B	Approach C
Lower bound	251,467.62	248,827.54	251,797.63

Upper bound		762,007.62	754,007.54	763,007.63
Type of Boat		Median WTP as % of coverage cost		
Lower bound	Hybr EB	35.92%	35.55%	35.97%
	Full EB	12.57%	12.44%	12.59%
Upper bound	Hybr EB	108.86%	107.72%	109.00%
	Full EB	38.10%	37.70%	38.15%
Years required to replace ferry - 8 ferry (Full EB)				
% of fleet replacement		# of years		
Lower bound	100%	63.6	64.3	63.5
	50%	31.8	32.2	31.8
	25%	15.9	16.1	15.9
Upper bound	100%	21.0	21.2	21.0
	50%	10.5	10.6	10.5
	25%	5.2	5.3	5.2
Years required to replace ferry fleet - 8 ferry (Hybr EB)				
% of fleet replacement		# of years		
Lower bound	100%	22.3	22.5	22.2
	50%	11.1	11.3	11.1
	25%	5.6	5.6	5.6
Upper bound	100%	7.3	7.4	7.3
	50%	3.7	3.7	3.7
	25%	1.8	1.9	1.8

[(a)] years required are obtained by dividing the values of the fleet by the annual median WTP considered. For example (700,000€ x 8) is the values of the Hybr fleet (5,600,000€). 5,600,000€/251,467.62€ = 63.6 years. This is the replacement period according to the lower model and approach (A).

The amount of the annual WTP necessary to achieve 100%, 50%, and 25% ferry fleet (consisting of eight boats) replacement has been investigated. For the full EB, the number of years required, according to the upper bound values, ranged from 5.3 years for 25% replacement to 21.2 years for 100% replacement. Looking at the lower bound WTP median values, time of replacement ranged from 15.9 years to 64.3 years.

For hybrid EB, the time of replacement values decreased considerably. Specifically, according to the lower bound median, the number of years ranged from 5.6 to 22.5, with the highest values turning out in approach B, while according to the upper bound median, the replacement period required ranged from 1.8 years to 7.4 years, with the highest values turning out in approach B.

For the purpose of this study, the hypothetical CO2 savings occurring by replacing the existing fleet with EB in the Trasimeno Lake has been explored. Specifically, the replacement of the existing fleet with EB, which emitted 319.6 tons of CO2, would have saved annually 63.9 tons of CO2 (7.9 tons of CO2 per boat). Focusing at the per capita CO2 savings, it was interesting to note that results were very similar between Trasimeno Lake (0.94 kg of CO2) and other lakes that are very different in

terms of conformations, such as the deep blue mountain Lucerne Lake with 1.18 kg of per capita CO2 savings. What would be the effect of pricing CO2 emissions from boating activities? A price on carbon might give a signal to polluters that decide themselves whether to reduce emissions, and it can also stimulate green technologies and market innovation, fueling new, low-carbon drivers of economic growth. However, currently carbon prices are too cheap to work as an incentive, ranging from less than 1€ up to 112€/tons of CO2 equivalent, and about three quarters of covered emissions are prices at less than 112€/tons of CO2 equivalent (World Bank and Ecofys, 2017). Earnings by selling the potential "credits", i.e., CO2 savings in Trasimeno Lake from the replacement of one conventional boat with an electric one would fall in the range of 75€ to 945€. This amount is not sufficient to act as a spur for investments in a green technology.

It should be stressed that, being the EB sector relatively young and still in the growth stages, a subsidy policy is required for success in the long run of EB in the boating industry. CO2 emissions become a problem when they accumulate over time, and power boating can create negative impacts in aquatic environments and their surrounding areas, in particular lakes (Mölders et al., 2010). Lakes' vitality might be threatened by several factors, including deposits left from boats can change the water's chemistry, which negatively affect aquatic plants and animals. An increasing cost of CO2 emissions should be taken into account. Therefore, when considering electric boating, additional benefits from such technology measured in terms of the avoided local pollution should also be taken into account.

4. Conclusions and policy implications

Tourism has been recognized as an important sector affecting the environment. There is a growing interest for environmental protection in navigation in historical and harbor cities, protected areas, and sensitive areas. This study assessed the users' WTP a premium for introducing EB to mitigate the environmental impacts of the current conventional boats in the Regional Park of Trasimeno Lake, and highlighted possible limitations and opportunities to green transportation.

The degree of uncertainty from WTP responses has been computed asking respondents between a range of values and a punctual value. Three approaches have been used to find conditional WTP referring to socio-economic aspects and visit's characteristics. Three main findings have emerged from the current study.

First, taking into account that only incremental WTP (bid) is used, very high amounts occurred, with tourists willing to pay, on average, from 15.68% to 18.51% more on the ticket price for introducing EB in the Trasimeno Lake.

Second, deepening the analysis, the possibility to replace the current conventional boats in Trasimeno Lake with hybrid EB or all EB has been considered. Clearly, the degree of coverage of the purchasing price through tourists WTP varies according to the technology's costs, which are higher in the case of all EB. According to the approaches used in this paper, it turned out that the annual mean WTP was able to cover slightly more than half of the hybrid EB's purchase price. The share decreased in the case of all EB, with annual tourists' WTP able to recover around one fifth of the purchase price. However, there were encouraging signs that users' participation may contribute to implement the development of EB, whatever hybrid EB or all EB, which represent viable, environmentally friendly alternatives to the current boating system.

Third, when looking at the effect of pricing CO2 emissions from boating activities, the earnings by selling the potential CO2 savings in Trasimeno Lake from the replacement of conventional boats with EB would have been not sufficient to stimulate ferry operators. This was due to the carbon prices that are actually very cheap.

This paper has provided some guidance for public and private authorities to speed up the technology innovation in the local public transport system, managing in a sustainable way the natural and the anthropic components of territory usage. It offered an initial step in exploring tourists' perception and behavior towards environment and cultural resources, and their WTP a higher price to contribute to buy an EB in Trasimeno Lake.

From the analysis carried out, it has emerged that the adoption of sustainable transportation systems such as EB in protected areas could be a distinctive trait able to attract tourists while minimizing their environmental impacts.

Findings could be also useful to assess public acceptability of EB in monetary terms in lakes of other countries. Indeed, some EB have been deployed in specific tourists' regions like Lucerne Lake in Switzerland and Venice in Italy. Results suggested potential for EB development. However, critical success factors for reaching their deployment included the implementation of effective and efficient policies that promote technological developments and attract sufficient investments, based on a subsidy policy.

Given the sizable financial resources required to make a transition from conventional to EB in local public transport systems, it is important to understand the market for EB. So far, very little has been done on this front. Tourism in the Regional Park of Trasimeno Lake is well developed and is taking advantages by the opportunities offered by the natural, historical and cultural heritage available. The impact of tourists on these resources must be carefully managed, directed and mitigated wherever possible. There is a growing consensus that sustainable tourism necessitates a balanced mix of government instruments which include an important role for information, education, and persuasion in changing behavior, demonstrating that all parties can gain advantages from development of sustainable approaches (Font and McCabe, 2017). Economic value estimation of the global externalities in lakes from users' activities can help to increase environmental awareness among users of the environmental consequences of the tourism pressure, encouraging behavior change.

Acknowledgements

The authors would like to thank Francesco Boccanera, Fabio Duca, and Gianni Sciurpi for providing help in finding data to carry out this research work. The authors are grateful to the editor and three anonymous reviewers for their useful comments. The responsibility for errors and opinions remains

with the authors.

References

Asplund, T.R., 2000. The effects of Motorized Watercraft on Aquatic Ecosystems. Madison: PUBL-SS-948-00 University of Wisconsin.

Astiaso Garcia, D., Cumo, F., Pennacchia, E., Sforzini, V., 2015. A sustainable requalification of Bracciano Lake waterfront in Trevignano Romano. Intern. J. Sustain. Dev. Plan. 10(2), 155-164.

Azam, M., Alam, M.M., Hafeez, M.H., 2018. Effect of tourism on environmental pollution: Further evidence from Malaysia, Singapore and Thailand. J. Clean. Prod. 190, 330-338.

Barr, S., Prillwitz, J., 2014. A smarter choice? Exploring the behaviour change agenda for environmentally sustainable mobility. Environ. Plan. C: Gov. Policy 32(1), 1-19.

Bergstrom, J. C., Boyle, K. J., Yabe, M., 2004. Trading taxes vs. paying taxes to value and finance public environmental goods. Environ. Resour. Econ. 28(4), 533-549.

Bianucci, M., Merlino, S., Ferrando, M., Baruzzo, L., 2015. The optimal hybrid/electric ferry for the Liguria natural parks. OCEANS 2015, IEEE, Genova, 1-10.

Bigerna, S., Polinori, P., 2014. Italian households' willingness to pay for green electricity. Renew. Sustain. Energy Rev. 34, 110-121.

Bigerna, S., Polinori, P., 2019. Evaluating an onshore wind farm enlargement project: A contingent valuation study in Central Italy, in: The Economic Valuation of Green Electricity. Springer, Dordrecht, pp. 27-52.

Blamey, R.K., Common, M.S., Quiggin, J.C., 1995. Respondents to contingent valuation surveys: Consumers or citizens? Aust. J. Agric. Resour. Econ. 39(3), 263-288.

Blancas, F.J., Lozano-Oyola, M., González, M., Caballero, R., 2018. A dynamic sustainable tourism evaluation using multiple benchmarks. J. Clean. Prod., 174, 1190-1203.

Bodde, D.L., Sun, J., 2016. Emergent entrepreneurial networks for the transition to automated urban mobility. 2016 IEEE Transportation Electrification Conference and Expo (ITEC), Dearborn, MI, US, 1-6.

Bravo-Vargas, V., García, R.A., Pizarro, J.C., Pauchard, A., 2019. Do people care about pine invasions? Visitor perceptions and willingness to pay for pine control in a protected area. J. Environ. Manag. 229, 57-66.

Chanashetty, V.B., Patil, B.M., 2015. Electric boat using solar energy. Indian J. Sci. Res. 12(1), 324-331.

Cheng, T.M., Wu, H.C., 2015. How do environmental knowledge, environmental sensitivity, and place attachment affect environmentally responsible behavior? An integrated approach for sustainable island tourism. J. Sustain. Tour. 23(4), 557-576.

Cook, D., Eiríksdóttir, K., Davíðsdóttir, B., Kristófersson, D.M., 2018. The contingent valuation study of Heiðmörk, Iceland–Willingness to pay for its preservation. J. Environ. Manag. 209, 126-138.

Del Pizzo, A., Polito, R. M., Rizzo R., Tricoli, P., 2010. Design criteria of on-board propulsion for hybrid electric boats. The XIX International Conference on Electrical Machines - ICEM 2010, Rome, Italy, 1-6.

Dijk, M., Orsato, R.J., Kemp, R., 2013. The emergence of an electric mobility trajectory. Energy Policy 52, 135-145.

Font, X., McCabe, S., 2017. Sustainability and marketing in tourism: Its contexts, paradoxes, approaches, challenges and potential. J. Sustain. Tour. 25(7), 869-883.

Hall, C.M., Härkönen, T., 2006. Lake tourism: An introduction to lacustrine tourism systems, in: Hall, C.M., Härkönen, T. (Eds.), Aspects of Tourism 32. Lake Tourism. An Integrated Approach to Lacustrine Tourism Systems. Channel View Publications, Toronto, pp. 3-26.

Hausman, J., 2012. Contingent valuation: From dubious to hopeless. J. Econ. Perspect. 26(4), 43-56.

Hearne, R.R., Salinas, Z.M., 2002. The use of choice experiments in the analysis of tourist preferences for ecotourism development in Costa Rica. J. Environ. Manag. 65(2), 153-163.

Høyer, K.G., 2000. Sustainable tourism or sustainable mobility? The Norwegian case. J. Sustain. Tour. 8(2), 147-160.

Karimpour, R., Karimpour, M., 2016. Development of hybrid propulsion system for energy management and emission reduction in maritime transport system. Open J. Mar. Sci. 6, 482-497.

Johnson, B.B., Slovic, P., 1995. Presenting uncertainty in health risk assessment: initial studies of its effects on risk perception and trust. Risk Anal. 15(4), 485-494.

Lal, P., Wolde, B., Masozera, M., Burli, P., Alavalapati, J., Ranjan, et al., 2017. Valuing visitor services and access to protected areas: The case of Nyungwe National Park in Rwanda. Tour. Manag. 61, 141-151.

Lee, Z., Sargeant, A., 2011. Dealing with social desirability bias: an application to charitable giving. Eur. J. Mark. 45(5), 703 – 719.

Loomis, J., 2011. What's to know about hypothetical bias in stated preference valuation studies? J. Econ. Surv. 25(2), 363-370.

Loomis, J., 2014. Strategies for overcoming hypothetical bias in stated preference surveys. J. Agric. Resour. Econ. 39(1), 34-46.

Łebkowski, A., 2017. Researching the impact of electric boat hull aeration energy consumption. Sci. J. Gdynia Marit. Univ. 98,148–156.

Mathieu, L. F., Langford, I. H., Kenyon, W., 2003. Valuing marine parks in a developing country: a case study of the Seychelles. Environ. Dev. Econ. 8(2), 373-390.

McFadden, D., Train, K. (Eds.), 2017. Contingent Valuation of Environmental Goods: A Comprehensive Critique. Edward Elgar Publishing, Cheltenham, UK, Northampton, MA, USA.

Mihalic, T., 2016. Sustainable-responsible tourism discourse–Towards ‘responsustable’tourism. J. Clean. Prod. 111, 461-470.

Milfont, T.L., 2009. The effects of social desirability on self-reported environmental attitudes and ecological behavior. Environ. 29, 263–269.

Mitchell, R.C., Carson, R.T., 1989. Using surveys to value public goods: The contingent valuation method. Nat. Resour. J. 29(3), 900-902.

Morandin, M., Bolognani, S., Campostrini, P., Ferrari, A., Guarnieri, M., 2015. Electric waterborne public transportation in Venice: A case study. Transportation Electrification Conference and Expo (ITEC), IEEE, Dearborn, MI, USA, 1-8.

Mozumder, P., Helton, R., Berrens, R.P., 2009. Provision of a wildfire risk map: Informing residents in the wildland urban interface. Risk Anal. 29(11), 1588-1600.

Mölders, N., Porter, S.E., Cahill, C.F., Grell, G.A., 2010. Influence of ship emissions on air quality and input of contaminants in southern Alaska national parks and wilderness areas during the 2006 tourist season. Atmos. Environ. 44(11), 1400-1413.

Onwujekwe, O., Hanson, K., Fox-Rushby, J., 2005. Do divergences between stated and actual willingness to pay signify the existence of bias in contingent valuation surveys? Soc. Sci. Med. 60(3), 525-536.

Park, T., Loomis, J., 1996. Joint estimation of contingent valuation survey responses. Environ. Resour. Econ. 7(2), 149-162.

Patti, S., 2018. Contingent valuation of "Green" tourism within Regional Natural Parks of Sicily: A willingness to pay analysis. Econ. Marche-J. Appl. Econ. 36(1), 34-54.

Petrosillo, I., Zurlini, G., Corliano, M. E., Zaccarelli, N., Dadamo, M., 2007. Tourist perception of recreational environment and management in a marine protected area. Landsc. Urban Plan. 79(1), 29-37.

Platania, M., Rizzo, M., 2018. Willingness to pay for protected areas: A case of Etna Park. Ecol. Indic. 93, 201-206.

Ramdas, M., Mohamed, B., 2014. Impacts of tourism on environmental attributes, environmental literacy and willingness to pay: A conceptual and theoretical review. Procedia-Soc. Behav. Sci. 144, 378-391.

Ready, R.C., Champ, P.A., Lawton, J.L., 2010. Using respondent uncertainty to mitigate hypothetical bias in a stated choice experiment. Land Econ. 86(2), 363-381.

Riddel, M., Loomis, J., 1998. Joint estimation of multiple CVM scenarios under a double bounded questioning format. Environ. Resour. Econ. 12(1), 77-98.

Rowe, R.D., Schulze, W.D., Breffle, W.S., 1996. A test for payment card biases. J. Environ. Econ. Manag. 31(2), 178-185.

Scuttari, A., Orsi, F., Bassani, R., 2018. Assessing the tourism-traffic paradox in mountain destinations. A stated preference survey on the Dolomites' passes (Italy). J. Sustain. Tour. 1-17.

Stylos, N., Koroneos, C., Roset, J., González-Sánchez, C., Xydis, G., Muñoz, F.S., 2018. Exergy as an indicator for enhancing evaluation of environmental management performance in the hospitality industry. J. Clean. Prod. 198, 1503-1514.

Togridou, A., Hovardas, T., Pantis, J.D., 2006. Determinants of visitors' willingness to pay for the National Marine Park of Zakynthos, Greece. Ecol. Econ. 60(1), 308-319.

Trip, J.J., Konings, R., 2014. Supporting electric vehicles in freight transport in Amsterdam. Electric mobility network, e-mobility North Sea Region (Report written within the framework of Activity 7.4 of the Interreg IVB project E-Mobility NSR). Electric Mobility Network, E-mobility North Sea Region.

Tsagarakis, K.P., Bounialetou, F., Gillas, K., Profylienou, M., Pollaki, A., Zografakis, N., 2011. Tourists' attitudes for selecting accommodation with investments in renewable energy and energy saving systems. Renew. Sustain. Energy Rev. 15(2), 1335-1342.

UNEP and UNWTO (2005). Making Tourism More Sustainable - A Guide for Policy Makers. France and Madrid, United Nations Environment Programme and World Tourism Organization.

Voltaire, L., Pirrone, C., Bailly, D., 2013. Dealing with preference uncertainty in contingent willingness to pay for a nature protection program: A new approach. Ecol. Econ. 88, 76-85.

Wang, S., Du, J., Li, S., He, H., Xu, W., 2019. Impact of tourism activities on glacial changes based on the tourism heat footprint (THF) method. J. Clean. Prod. 215, 845-853.

Welsh, M.P., Poe, G.L., 1998. Elicitation effects in contingent valuation: Comparisons to a multiple bounded discrete choice approach. J. Environ. Econ. Manag. 36(2), 170-185.

Whitehead, J.C., Pattanayak, S.K., Van Houtven, G.L., Gelso, B.R., 2008. Combining revealed and stated preference data to estimate the nonmarket value of ecological services: An assessment of the state of the science. J. Econ. Surv. 22(5), 872-908.

World Bank and Ecofys, 2017. Carbon Pricing Watch 2017. Washington, DC: World Bank.

Zellner, A., 1962. An efficient method of estimating seemingly unrelated regression equations and tests for aggregation bias. J. Am. Stat. Assoc. 57(298), 348-368.

HIGHLIGHTS

- Contingent valuation method contributed to inform protected area decision-making
- Tourism had a significant impact on the natural and man-made environment
- Tourists, on average, were willing to pay price premiums for having electric boats
- High Education level, raising sustainable mobility knowledge, lowered uncertainty
- Educational levels were also significant predictors of the tourists' WTP