Economic assessment of the use and conservation of suburban parks. Two cases in Spain

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Abstract

The resurgence of the concept of quality of life in urban and suburban areas has highlighted the need for economic valuations of the multiple services that parks provide for the population. The use of the Contingent Valuation Method and the various one-stage and two-stage regression models has a low willingness to pay for the parks analyzed. It also confirmed the importance of the socioeconomic profile, as well as the attitudinal profile in willingness-to-pay decisions. Finally, the use of two-stage model showed that the willingness-to-pay decision (willingness or not to pay and the quantity to pay) is sequential.

***Key-words**: Contingent Valuation Method, natural resources, management, regression models, willingness to pay..*

Résumé

La résurgence du concept de qualité de la vie dans les zones urbaines et suburbaines a mis en évidence la nécessité d´une évaluation économique des multiples services que les parcs offrent à la population. L'utilisation de la méthode d'évaluation contingente et de divers modèles de régression en une seule étape et en deux étapes a révélé un faible consentement à payer pour les parcs analysés. Elle a également confirmé l'importance du profil socio-économique ainsi que du profil d'attitude envers la décision d´accepter de payer. Enfin, l'utilisation du modèle en deux étapes a montré que le consentement à payer (consentement à payer ou non et la quantité à payer) est séquentielle.

Mots-clés: Méthode d'évaluation contingente, ressources naturelles, gestion, modèles de régression, consentement à payer.

1. Introduction

In Spain, 77% of the population lives in urban areas with a growth rate of 1.2% in the period 2005-2010, while in Western Europe the percentage is 80% and the rate of growth is 0.7% (UNFPA, 2010). With an increasingly urbanized society, the strategic importance of urban and suburban parks has become essential to improve the quality of life in these communities dominated by asphalt, noise and pollution (Del Saz-Salazar and Rausell-Köster, 2008). The more populated cities are, the greater the need for natural areas that project healthier life styles in harmony with the environment to the people.

This view is supported by the need to maintain the different services that natural areas provide for the general welfare of the population. In the first place the important environmental services provided should be highlighted. These include filtering the air and water, noise and the stabilization of microclimates, as well as their potential to create the habitats necessary for the conservation of bio-diversity (Chiesura, 2004). Secondly, there are the recreational benefits which they offer to their visitors which allow for new forms of leisure in the cities (Bernarth and Roschewitz, 2008). Recreational activities such as walking, cycling, yoga, nature watching, seeking new experiences and being with the family in a natural environment encourage citizens to participate in activities in the open air (Chiesura, 2004; Neuvomen *et al*., 2007). Third, natural areas also provide social and psychological services that are vital for the habitability of modern cities and the wellbeing of their inhabitants. Among these social services there are improving social integration and interaction among residents (Tyrväinen *et al*., 2007). It has thus been shown that the presence of green areas in urban areas promotes the development of social ties among residents (Kuo *et al*., 1998). For their part, the psychological benefits make themselves present in improved physical and mental health of both visitors and citizens (Chiesura, 2004; Korpela *et al*., 2008), for example, in reducing daily stress (Grahn and Stingdotter, 2003), decreasing fatigue (Kaplan, 1995) and improving the balance of emotional control (Korpela and Hartig, 1996). Fourthly, there is the aesthetic value that they provide for the urban landscape (Chen *et al*., 2009). According to the biophilia hypothesis, people prefer natural landscapes to urban landscapes, and especially those dominated by vegetation and water (Del Saz-Salazar and Rausell-Köster, 2008). Fifthly and finally there are the economic benefits derived from the environmental benefits, which may lead to a reduction in the costs of contamination and prevention measures. All these services provided by natural areas increase the attractiveness and sustainability of cities as well as the quality of life of their citizens.

From this perspective it is essential to assess, in economic terms, the benefits that individuals assign to natural areas through cost-benefit analysis (Mitchell and Carson, 1989). The economic valuation of these benefits can help urban planning strategies, conservation and develop-

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ment (Jim and Chen, 2006). The problem that arises here centers on the fact that the valuation of the several benefits natural areas provide to society is a difficult task. This is because natural areas have a unique feature in that they share characteristics of public goods (non-exclusion and non-rivalry in consumption) and open access resources, and thus lack of a market where they can be exchanged and so do not have a price. The absence of an assessment of the value of these resources can lead to their over-exploitation, inappropriate use and the failure to comply with the previously mentioned social functions (Del Saz-Salazar and Rausell-Köster, 2008). Thus, to avoid this problem various direct and indirect valuation techniques to quantify preferences in the absence of a market have been developed.

In this paper, Contingent Valuation Method (CVM) will be used to determine the value which natural areas have for their visitors, as well as determine which socio-economic and attitudinal characteristics influence this valuation. Specifically, it aims to determine the value of the recreational use and the value of conservation that visitors place on urban and suburban parks. Additionally it analyzes the influence of the socio-economic (age, gender, education level and income) and attitudinal (frequency of visit and satisfaction) characteristics of visitors on their economic valuation. To achieve these objectives, various one-stage (Logit, Probit and Spike) and two-stage (double censored Tobit) regression models are used. The objects of the study are two suburban parks, Monte San Pedro Park (A Coruña) and Grajera Natural Park (Logroño). The economic valuation of suburban parks has been little studied in the area of environmental studies. This points to the necessity to find out the economic valuation that visitors place on their use and conservation, as well as the need to define the socio-economic and attitudinal profile that might determine their valuation, in order to progressively achieve the revaluation of these resources.

It must also be pointed out that Spain's delicate economic situation has caused the governments of autonomous communities to make budget cutbacks in the area of the environment. These cuts, among other things, have affected the funds dedicated to the protection and improvement of specific areas like Monte San Pedro Park and Grajera Natural Park. To this a further difficulty must be added, the fact that in most regions of Spain (and this is the case in A Coruña and Logroño), suburban parks do not have their own approved category of legal protection, similar to that enjoyed by National Parks and Nature Reserves. The absence of a legal structure for these parks combined with finding cutbacks and the low level of awareness of society about paying for public goods have a negative effect on the WTP of citizens for their use and conservation. For these reasons, we seek to find out whether citizens would be willing to give up part of their personal income in order to keep these parks in their present state.

2. Theoretical Framework

2.1. CVM in studies of the environment

CVM is a hypothetical and direct method based on surveys of consumers. Through these surveys it seeks to determine consumer preferences regarding public goods, by constructing a hypothetical market based on the market for private goods (Mitchell and Carson, 1989). Its main objective is to estimate the maximum "willingness-to-pay" (WTP) of individuals for the provision of a hypothetical public good or service (Mitchell and Carson, 1989). The main assumption of this method is that the economic values that people attach to environmental goods are hidden and can be revealed through the creation of markets. Consequently, the value of any good depends on its usefulness to individuals, and individuals behave rationally to maximize that utility (Hoevenagel, 1994).

Despite the advantages of CVM[1], it has been widely criticized because of potential biases that may arise in implementing it[2]. Due to the problems resulting from the presence of these biases in the estimates it is necessary to avoid, as far as possible, the presence of any bias in the carrying out of CVM in order to obtain reliable responses that do not detract from the usefulness of the method in the economic valuation of environmental resources (Arrow *et al*., 1993).

Finally, it is worth mentioning some of the most recent applications of CVM in the economic evaluation of natural areas. Within the extensive literature that CVM applies to the management and planning of natural areas, there are studies that have estimated the value of the recreational use of various environmental resources (e.g. Del Saz-Salazar and Rausell-Köster, 2008; Majumdar *et al*., 2011) and those that have estimated the value of non-use relative to conservation (e.g. Lo and Jim, 2010; Álvarez *et al*., 2010). In Table 1 it can be seen that both in the national and international context two characteristics shared by the majority of studies stand out: the most frequently employed type of sur-

[1] The main advantages are: (1) It is the only method available when it is impossible to establish a link between the quality of the environmental good and the consumption of a private good; (2) Its flexibility makes it suitable for addressing all kinds of public goods and situations; (3) Ex-ante valuation; (4) the Hicksian consumer surplus measure can be obtained directly; (5) It allows for the estimation of non-use values (Carson, 2000).

[2] Potential biases which can arise for a variety of reasons. (1) The hypothetical nature of the simulated market can trigger strategic behaviour (free riding) by respondents. (2) The "embedding" effect, when WTP for goods and services does not vary according to the context; (3) The "sequence" effect, where WTP varies according to position of the good in the valuation sequence; (4) The "information" effect, where WTP is influenced by the type of information supplied across different valuation scenarios; (5) The elicitation effect, where WTP is influenced by the elicitation format; (6) The hypothetical bias, where the hypothetical market presented differs considerably from the real market; and, finally, (7) Protest zeros, which are motivated by protest behaviour triggered by some components of the survey design, such as the payment vehicle, or ethical objections to personal payment for a public good (Venkatachalam, 2004).

Table 1. *Recent studies that have applied CVM in the economic valuation of natural areas.*

Reference	Year of study	Size of sample	Survey format	Evaluation question format	Value type	Average WTP	Socio-economic characteristics that influence WTP[e]
Jim and Chen (2006)	2003	340	EP	FA	Use	2,11$/day	income (+)
Del Saz-Salazar and García (2007)	2001	900	EP	FA	Use	71,77€/year 62,63€/year[a]	education level (+), income (+)
Martín-López et al. (2007)	2004	649	EP	FA	Conservation	30,8€/year	age (-)
Pedroso et al. (2007)	2001	230 192	EP EM	FA FA	Conservation	47,3€ y 56,9€/year 29,4€ y 48,2€/year[b]	
Zoppi (2007)	na	210	ET	FD+FA	Conservation	25,95€/year 19,14€/year 16,42€/year[c]	
Adams et al. (2008)	*na*	648	EP	FA	Conservation	60,39$ ha/year	age (-), income (+)
Baral et al. (2008)	2006	315	EP	R	Conservation	69,2$/year	size of family (-)
Bernarth and Roschewitz (2008)	2004	558	EM	FA	Use	57,2€/year 80,6€/year[d]	income (+)
Chen and Jim (2008)	2006	598	EP	FD	Use	21,96$/year	income (+)
Del Saz-Salazar and Rausell-Köster (2008)	2005	1455	EP	FA	Use	7,60€/year	age (+), education level (+), income (+)
Álvarez et al. (2010)	na	454	EP	FD	Conservation	14,36€/day	Gender, being a woman (+)
Chen and Jim (2010)	2007	562	EP	FDD	Conservation	24,7€/year	income (+)
Lo and Jim (2010)	2008	495	EP	CP	Conservation	9,90$/year	age (-), income (+)
Majumdar et al. (2011)	2008/09	478	EP	CP	Use	11,25$/day	income (+), education level (+)

OQ: open question; FD: dichotomous question; FDD: double dichotomous format; FD+FA: dichotomous choice and open question; CP: payment card; R: referendum; EP: personal interview; EM: e-mail interview; ET: telephone interview; na: not available. To obtain estimates of WTP in a standard form, all amounts have been converted to dollars or Euros, as appropriate.
a Two results are shown, the first taking into account proximity to the park and the second following Ayer's algorithm.
b Estimates of WTP on the basis of the spike model, the first through a tax, the second through a single donation.
c Each amount corresponds to a different evaluation scenario.
d Average WTP based on the initial starting price proposed and the revised value after removal of protest responses.
e If the economic characteristics positively affect WTP a (+) is added, if it negatively affects WTP a (-) is added.

vey is the personal questionnaire and the most common question format is the open question.

The majority of studies that have calculated the WTP of natural areas have also sought to determine the influence of the socio-economic characteristics of the respondents in their evaluation. Socio-economic variables are commonly used as explanatory variables to control for individual heterogeneity (Arrow *et al*., 1993). In the studies reviewed, it can be seen that the most important determinant of WTP of individuals is their personal income, followed by educational level and age. It can be seen from these studies that while income and education generally play a positive role in WTP, the age of respondents has a negative effect.

Recently, it has become clear that there is a need to consider not only the monetary value and the socio-economic characteristics of the individuals but also the personal motivations that underlie the responses to CVM (Kotchen and Reiling, 2000; Spash, 2006). For this reason, the influence of two attitudinal factors, frequency of use and degree of satisfaction will be also analyzed. Various environmental studies have already demonstrated that the WTP of visitors increases with the level of satisfaction obtained during their stay in a natural area (Affizzah *et al.,* 2006; Baral *et al*., 2008) and decreases with frequency of use (Del Saz-Salazar and Rausell-Köster, 2008; Álvarez *et al*., 2010).

2.2. Econometric models for modeling WTP

Two types of econometric model have been used to evaluate WTP: single-stage models like Logit and Probit (Hanley *et al*., 1997) and the Spike model (Kriström, 1997) and a stage model like double censored Tobit (Heckman, 1979).

2.2.1. The Logit and Probit Models

The Logit and Probit models are calculated in a similar way, with the Logit model being less restrictive in how it assumes the statistical conditions of the distribution function. To calculate the mean WTP a simple model was used based on the work of Hanley *et al.* (1997) and Samnaliev *et al*. (2006)[3].The mean WTP is calculated by

$$\text{mean WTP} = [1- \text{Gwtp}]dW \quad (1)$$

where Gwtp is the distribution function of the true WTP. T is infinite for the true intention to pay and is truncated at some value for the purpose of estimation. In this case the mean WTP is calculated by integrating a logit function where the price is cut off on the basis of the maximum WTP offered by respondents and limited in order to be positive.

2.2.2. The Spike Model

The conventional dichotomous model of CVM assumes that WTP is positive. However, it is possible that some peo-

[3] See the full development of the traditional Logit and Probit models in Hanley *et al.* (1997) and Samnaliev *et al*. (2006).

[4] If no account of this discontinuity is taken, the model may suffer from heteroskedasticity and the estimators may be biased (Halvorsen and Saelensminde, 1998).

ple's WTP is zero and, therefore, a discontinuity occurs in the distribution of WTP[4]. Thus, when there are many zero responses and the WTP distribution is asymmetric, a more appropriate model, like Spike, must be used (Casado *et al*., 2004; Hanley *et al*., 2009*)*. The Spike model (Kriström, 1997) allows individuals to have a zero willingness to pay for the public good and assigns a non-zero probability of WTP responses = 0. This may cause a "spike" in the distribution function of WTP, i.e. a discontinuity or a jump at zero. Yoo and Kwak (2002) assert that the Spike model, by taking into account all possible zero responses, significantly improves on conventional model-based approaches.

The spike model can be estimated with a variety of approaches, but the most popular techniques are the parametric maximum likelihood methods. Generally speaking, the spike model uses two valuation questions. First, the respondent is asked whether she or he wishes to contribute economically to a specific public good or not. It is necessary to establish whether or not the respondent is part of the commodity market (E_i). Then, it is necessary to construct a variable to show whether his/her WTP is higher than the proposed bid (D_i), where *A* is the bid, as follows:

$$Ei = 1 \text{ if } WTP > 0 \text{ (0 in all other cases)} \quad (2)$$

$$Di = 1 \text{ if } WTP > A \text{ (0 in all other cases)} \quad (3)$$

Moreover, the maximum likelihood function is defined

$$l = \sum^{N} E_i D_i \ln[1 - F_{DAP}(A)] + E_i(1 - D_i)\ln[F_{DAP}(A) - F_{DAP}(0)] + (1 - E_i)\ln[F_{DAP}(0)]$$

The mean WTP and the spike value are shown in (4) and (5), respectively, where α is the marginal utility to use or conserve the natural areas[5], and β the marginal utility of the income. The spike is defined as the probability value when the WTP is equal to zero (Kriström, 1997).

$$media = \frac{1}{\beta}\ln[1 + e^{\alpha}] \quad (4)$$

$$spike = \frac{1}{1 + e^{\alpha}} \quad (5)$$

2.2.3. The Double Censored Tobit Model

Tobit or truncated, or censored, models (Tobin, 1958; Goldberger, 1964) have been proposed as a better alternative to CVM estimates, since the range of the dependent variable is constrained to zero (Halstead *et al*., 1991; Seung-Hoon*et al*., 2000). However, the Tobit model does not take into account the possible selection effect on the sample determined by the willingness to participate or not in the market model. The selection effect has generated discussion on the treatment of protest responses[6] in the analysis. Generally, CVM studies include real zeros and exclude the protest responses (Mitchell and Carson, 1989; Del Saz-Salazar and Rausell-Köster, 2008), which could affect the validity of the results obtained (Martín-Ortega *et al*., 2009)[7].

Heckman's (1979) model deals with the problem of sample selection and has two stages. In the first the function is estimated that specifies the probability that the respondent would or would not be willing to pay for the recreational use or conservation of the parks and in the second the quantity he or she would be willing to pay is estimated in another function. That is to say, there are no motives for thinking that protest responses exist[8]. Both decisions depend on a number of socioeconomic factors (age, gender, education level, income) that may be the same or different at each stage. Therefore, Heckman's Selection Model is one which allows different explanatory variables to determine the decision to pay or not and also the decision regarding how much to pay. Furthermore, the relationship between the two decisions could be dependent or independent, that is to say, they may be taken either simultaneously or sequentially (Sánchez and Barrena, 2006). This decision model is made up of two equations: the selection equation (Z_i^*) and the principal equation (Y_i^*),

$$Z^* = x'_i\alpha + \varepsilon_{1i} \quad \text{where} \quad \begin{cases} Z_i = 0 \text{ if } Z'_i \leq 0 \\ Z_i = 1 \text{ if } Z'_i > 0 \end{cases} \quad (6)$$

$$Y^* = w'_i\beta + \mu_i \quad \text{where} \quad \begin{cases} Y_i = Y^* \text{ if } Z'_i = 1 \\ Y_i = 0 \text{ if } Z_i = 0 \end{cases} \quad (7)$$

Where Z^* is a latent variable which determines whether or not the individual is willing to pay for the use or conservation of parks (according to the survey), and which depends on a series of factors x_i.

Y^* is a latent variable which determines the amount the visitor is prepared to pay and which depends on a series of factors w_i.

ε_{1i} and μ_{iI} are the random disturbances of both equations.

Heckman (1979) showed that estimates of WTP by Ordinary Least Squares (OLS) for sub-sample of visitors who

[5] As already indicated the type of value analyzed depends on the sample used. If the 2008 sample is analyzed, it can be seen that the marginal utility of the recreation use of the parks is measured whereas if the 2010 or 2012 samples are analyzed it is the utility generated by the conservation of these areas that is measured.

[6] The refusal to pay can be expressed both through the true values of zero and protest responses. Protest responses are understood as a refusal to pay related to the hypothetical market approach itself, rather than an expression of the real value of the resource. Conversely, if the refusal to pay reflects true preferences (the individual is indifferent to the good under valuation) or is the result of insufficient income, the zero is referred to as real (Bengochea *et al.*, 2003).

[7] Eliminating the negative responses can only be considered legitimate if the group of "protestors" is not significantly different (in terms of the characteristics which influence the evaluation of the good) from the sample as a whole (Martín-Ortega *et al.*, 2009). If this is not the case, a selection bias in the simple results will affect estimates of WTP.

[8] In this case a protest response would be one in which at the first stage the interviewee agreed to pay for the use or conservation of a park, but when it came to the second stage covering the amount to be paid, responded with the amount zero.

offer protest responses would produce inconsistencies in *w* due to the presence of sample selection bias,

$$E(y_i^*|z_i = 1) = w_i'\beta + E(\varepsilon_i|\mu_i \succ -x_i'\alpha) = w_i'\beta + \rho\mu\frac{\phi(x_i'\alpha)}{\Phi(x_i'\alpha)} \quad (8)$$

Where the term $\rho\mu\frac{\phi(x_i'\alpha)}{\Phi(x_i'\alpha)}$ is the self-selection bias of respondents who are WTP, referred to as the simple specification error or omitted variable problem (Heckman, 1979). For this reason he proposed a two-step estimator to correct the bias and obtain reliable estimates of *w.* The estimator is carried out in two steps. In the first the expected value of a $z = 1$ and the vector $w_{i\,i}$ is,

$$E(y_i|z = 1, w_i) = w_i'\beta + \rho\sigma_j\lambda(x_i'\alpha) \quad (9)$$

Where $\lambda(x_i'\alpha) = \phi(x_i'\alpha)/\Phi(x_i'\alpha)$ is the inverse Mills ratio, and ϕ and Φ are the normal density function and normal standard function, respectively. The first step in Heckman's model consists of using the Probit model (Eq. 7) to obtain an estimator consistent with α. Then the estimated α is utilized to construct the variable λ. In the second stage λ is included as a regressor in Eq. 8, which makes it possible to estimate *w and* ρ through the use of OLS. On the basis of the null hypothesis of no selection bias (that is to say, $\rho = 0$), the normal formula provides a consistent estimate of the covariance matrix of *w.* Thus, if $\rho = 0$, both decisions are independent or sequential. Following the alternative hypothesis $\rho \neq 0$, both decisions are dependent or simultaneous.

3. Methodology

3.1. Study sites

'Monte San Pedro Park', opened on June 6 1999, is located in the north-west of the Iberian Peninsula (Spain). It is a large leisure-oriented, suburban, aesthetically up-to-date, topographically-varied area measuring 7.84 ha, and offering vistas of the city of A Coruña (Galicia) and a wide strip of coast line. The seashore is of particular interest due to characteristic rock formations, flora and fauna. The military occupation of the area that occurred during the Second World War left its mark in the form of a number of constructions that have proved highly attractive to visitors. Finally, the park has various sites which offer magnificent views of the city of A Coruña and an overall view of some of its most emblematic sights such as *la Bahía del Orzán, la Casa del Hombre, la Casa de los Peces* and *la Torre de Hércules.*

The Grajera Natural Park, opened on September 17 1992, is located in the mid-northern part of the Iberian peninsula (Spain). It is a suburban area of exceptional natural beauty situated 4 kilometres southwest of Logroño, the Riojan capital. One of the region's few wetlands is inhabited by numerous species of flora and fauna, where opportunities for games, sport and environmental education are combined with respect for nature. The park itself occupies 55 hectares, and there are 32 hectares of marshland and an 85-hectare golf course. This has led managers to divide it into three distinct areas. The welcome zone, where entrance is free of charge, includes the park entrances and user amenities, including the car park, bar, restaurant, classroom, and a picnic area with barbecue facilities, benches and tables. There is restricted entrance to the bird-watching area, where it is possible to observe numerous water birds. Finally, the wetland reserve comprises a 32-hectare sheet of water with an average depth of 5.5 meters and its surroundings currently dominated by agricultural cropland. Access to the latter is reserved strictly for scientific and educational purposes.

There are three main motives for the selection of these parks. Firstly, the two spaces share the basic characteristics of parks but each of them has a unique characteristic. San Pedro Park is a natural suburban coastal area situated on the edge of the Atlantic Ocean, it is well planned and managed for the purpose of looking at the scenery, relaxation and sports activities. Grajera Park, on the other hand, is a suburban wetland situated in the center-north of the Iberian Peninsula with a wild habitat and a lower degree of human intervention in the spatial distribution pattern. It is mainly focused on the observation of flora and fauna, scientific and recreational activities and environmental education. Secondly, each space is to be found in a different geographical location in the territory of Spain, which implies greater possibilities for the generalization of this study results to other suburban areas with similar characteristics; thus, the results obtained may be useful for urban planning and land management purposes. Thirdly and finally, it is noticeable that the economic valuation of urban and natural parks has been the subject of a great deal of study while the valuation of suburban parks has received much less. This points to the necessity of discovering the economic value that visitors place on their use and conservation, as well as the factors that influence this valuation, in order to determine the level of citizen involvement in this type of good and to progressively achieve a higher level of valuation for them as well as their conservation.

3.2. Data and measurements

Prior to the surveys, a pilot study was carried out on a sample of 30 subjects to ensure the validity and user-friendliness of the questionnaire. The pilot study was developed and administered in a series of meetings and interviews with experts and focus groups (made up of potential visitors to the areas under analysis) who helped us make minor adjustments. Once the pilot study had been carried out, two random samples of the citizens of A Coruña (San Pedro Park) and La Rioja (Grajera Park), who were visiting the parks at that time, were carried out, and a total of 880 face-to-face personal interviews were obtained. Specifically, the first sampling was carried out from January to April 2008 for the San Pedro and Grajera Parks. The second sampling took place from April to June 2010 for San Pedro and Grajera

Parks. On average, respondents took 20-25 min to complete the oral questionnaires with the interviewers' assistance. The final sample consisted of 785 usable questionnaires, 381 from the 2008 sample (180 from San Pedro Park and 201 from Grajera Park); 404 from the 2010 sample (194 from San Pedro Park and 210 from Grajera Park); with 95 questionnaires being rejected. Thus, the acceptance rate was 90.7% for the 2008 survey (85.7% for San Pedro Park and 95.7% for Grajera Park) and 87.8% for the 2010 survey (84.3% for San Pedro Park and 91.3% for Grajera Park).

We used three sections from the surveys for the development of this study. The first section contains questions relating to the attitudes and behaviors of visitors during their stay in the natural area. Thus the frequency of visits was evaluated through two items that looked at the non-habitual or monthly and daily or weekly use that visitors made of the area (Granh and Stigsdotter, 2003). Furthermore, satisfaction was evaluated through five items measured on a Likert-type scale with five levels in order to capture the effect on the user's personal welfare of a visit to the natural area (Oliver, 1997).

The second section examines the economic valuation in itself, assessing the WTP for the recreational use or conservation of the suburban park, depending on the survey being examined[9]. The monetary valuation was measured with CVM (Mitchell and Carson, 1989). Thus at the valuation stage, respondents were reminded of the current state of the park and the main services offered by it for visitors. They were then asked to show their willingness to economically contribute for the recreational use (2008 Survey) or the conservation of the park (2010 Survey) through the payment of an entrance fee which would have to be paid by all users who wanted to enter the park, a fee to be administered by the appropriate autonomous regional government. Respondents were also reminded of their own budgetary restrictions so that they would answer as truthfully as possible (Arrow *et al*., 1993). Once the details of the valuation stage had been set out, a dichotomous question was put to respondents to which they had to answer either "yes" or "no" to the sum of money proposed (1,5€, 2,5€ or 3,5€) that they pay for the use or conservation of the park, depending on the case. They were then asked two open questions that requested their maximum and minimum WTP (Zoppi, 2007). Individuals who were not willing to pay anything were asked why, in order to differentiate zero responses from protest responses (Jorgensen *et al*., 2001).The final part of the questionnaire was used to collect data to identify the socio-economic profile of the respondents.

4. Results

The results section has been divided into three sub-sections. The first describes the two samples analyzed in terms of their socioeconomic and attitudinal profile. The second presents estimates of WTP for the use and conservation of natural suburban areas through the use of Logit models and Spike. The third and final section analyzes the influence of the socioeconomic and attitudinal characteristics of respondents in their WTP responses through the use of single-stage Logit and Probit models and two-stage Tobit model. NLOGIT v.4.0 software was used to obtain these results.

4.1. Description of the samples

This results section begins by describing the socio-economic and attitudinal profiles of the visitors to the two selected suburban parks with the objective of determining the profile of the typical visitors to these areas. Table 2 shows the profiles of the users of San Pedro and Grajera Parks on the basis of the 2008 and 2010 surveys. In general, data shows that the visitors to these parks are women between 30 and 50 years of age, high school or university graduates and with a medium level of income. It also shows that the majority of the users are assiduous visitors to the parks and are satisfied with their visits.

4.2. Single- stage Models. WTP Calculation

Prior to WTP being estimated, its distribution was calculated for the use and conservation of natural areas for the samples. The distribution of WTP was considered with regard to the three proposed starting prices (1.5€, 2.5€ and 3.5€). In all surveys, as the size of the initially proposed payment increased, the proportion of respondents willing to pay decreased. Thus, it can be stated that people are willing to pay low prices both for the use and conservation of urban and suburban parks.

As has already been pointed out, the objective of CVM is to obtain a measurement of well-being, such as WTP. The WTP is calculated through the integration of a Logit function (Eq.1) with the price being cut off on the basis of the maximum value for WTP offered by respondents and is limited so that they are positive. With regard to recreational use the maximum values were 5.5 and 5 Euros, for San Pedro Park

Table 2 - *Socio-economic and attitudinal profile of respondents.*

	2008 Sample		2010 Sample	
	San Pedro Park	Grajera Park	San Pedro Park	Grajera Park
Socio-Economic Factors				
Age				
Less than 30	30.6%	16.4%	24.7%	26.7%
30-50	55.0%	39.8%	43.3%	45.7%
Over 50	14.4%	43.8%	32.0%	27.6%
Gender				
Male	50.6%	40.3%	41.8%	44.8%
Female	49.4%	59.7%	58.2%	55.2%
Education Level				
None	7.2%	11.4%	21.6%	1.4%
Primary/ESO	14.4%	23.4%	11.3%	24.8%
High School/FP	42.8%	30.3%	31.4%	37.6%
Graduate	35.6%	34.8%	35.6%	36.2%
Income				
Low	33.3%	13.9%	24.7%	15.7%
Medium	52.2%	55.2%	43.3%	67.1%
High	14.4%	30.8%	32.0%	17.1%
Attitudinal Factors				
Frequency of use				
Not normally	56.7%	45.3%	40.7%	19.0%
Daily or weekly use	43.3%	54.7%	59.3%	81.0%
Level of Satisfaction	3.79[a]	3.16	3.86	3.90
Total Sample (n=785)	**180**	**201**	**194**	**210**

[a] The level of satisfaction was measured on a scale of 1 to 5 with 5 representing the high-test degree of satisfaction.

[9] The proposed assessment scenario and the contingent valuation questions are explained in Appendix 1.

Table 3 - *WTP Calculation.*

	2008 Sample (use)		2010 Sample (conservation)	
Variables	San Pedro Park	Grajera Park	San Pedro Park	Grajera Park
Mean WTP	1.01	0.58	0.69	0.65
Spike Value	0.77	0.91	0.75	0.83
Observations	180	201	194	210

*** p<0.01. The WTP averages are expressed in Euros (€).

and Grajera Park, respectively. With regard to conservation, the maximum value is 4 and 4.5 Euros for San Pedro Park and Grajera Park, respectively. Table 3 shows the Logit model estimates and from it, it can be seen that the average WTP for respondents for recreational use is 1.01 Euros in the case of San Pedro Park and 0.58 Euro in the case of Grajera Park. The average WTP for conservation is 0.69 Euro for San Pedro Park and 0.65 Euro for Grajera Park.

On the basis of these preliminary results it was considered appropriate to use the Spike model through the maximum likelihood method. In this case, Eq.4 was used to estimate the mean WTP. The results show an average WTP of 0.77 Euro for the recreational use of San Pedro Park and 0.91 Euro for Grajera Park, while the average WTP for the conservation was 0.75 Euro for San Pedro Park and 0.83 Euro for the Grajera Park. These results show that the average WTP for these parks is low and that there are no significant differences depending on the type of value analyzed (use value and conservation value).

The single-stage Logit and Probit models with covariates were used to determine the socio-economic and attitudinal variables which influenced the WTP of the respondents (Table 4). In order to find out which characteristics affect the valuation the data was pooled, using dummies to identify different subsamples (San Pedro Park and Grajera Park) and different types of values (2008 and 2010). The results suggest that young people with a high level of education, high income and a high satisfaction level are more willing to pay for the use and conservation of these parks. However, gender and frequency of use have not revealed significant differences in terms of WTP. Furthermore, the statistical significance of the 'bid' variable reveals the effect of the amount proposed in the questionnaire on the respondent's final valuation. Thus, the higher the starting price offered, the lower the WTP of the visitor. In addition, the significance of the variables "park" and "year" suggests that the parks and the years analyzed differ from one another.

Table 4 -WTP Determinants.

Variables	*Logit*	*Probit*
Constant (α)	-3.07***	-3.13***
Bid Price (β)	-6.35***	-6.47***
Parque San Pedro	3.71***	3.54***
Age	-2.16**	-2.31**
Gender	1.32	1.22
Education Level	2.35**	2.31**
Income	1.62*	1.72*
Frequency of Use	-0.37	-0.44
Year	1.92*	2.07**
Satisfaction	2.15**	2.13**
Observations	785	785
Log Maximum Likelihood	-323.36	-323.95

***p<0.01, **<0.05, *p<0.10.

Table 5 - *Results of the Double Censored Tobit Model (Heckman).*

Variables	1st Eq[a]	2nd Eq.
Constant (α)	-3.13***	-4.02***
Bid Price (β)	-6.47***	0.48
Parque San Pedro	3.54***	2.93***
Age	-2.31**	-2.94***
Gender	1.22	0.78
Education Level	2.31**	3.04***
Income	1.72*	2.96***
Frequency of Use	-0.44	-0.19
Year	2.07**	-0.78
Satisfaction	2.13**	2.51**
Lambda[b]	-	11.35
(sig.)		(0.00)
Observaciones	785	145
Log Maximum Likelihood	-323.94	-804.15
Chi-square	103.29	79.57
(prob)	(0.00)	(0.00)

***p<0.01, **<0.05, *p<0.10. a Heckman's model has two stochastic equations, the first is the selection equation and the second is the main equation. b Inverse Mills ratio.

4.3. Two-stage model. The Double Censored Tobit Model

To finalize the results section, the influence of the socio-economic characteristics of respondents on their WTP decisions through a two-stage model is analyzed. The double censored Tobit model proposed by Heckman uses a Probit model to calculate the probability (in the light of certain interest variables which determine the decision) of an individual deciding to pay or not to pay. This calculation produces the statistic known as the Inverse Mills ratio (Lambda) which is integrated into the original regression model (calculated using Minimum Least Squares) as another regressor in order to capture whether visitors decision to pay occurs simultaneously or sequentially.

Table 5 presents the results of multivariate analysis by the two-stage Heckman model. The significance of the Inverse Mills ratio shows that users make their WTP decisions sequentially, that is to say, they first make a decision concerning their willingness or not to pay and then they decide how much they are willing to pay. Furthermore, the chi square shows that the selected explanatory variables, taken as a whole, have a very significant effect on willingness to pay. It is also worth noting the significance of the coefficient on $\lambda = 11.35$ in the outcome equation signifies the p-

resence of sample selection bias, which justifies the use of the sample selection model.

Once the sequential nature of the two payment decisions is confirmed, the influence of the socio-economic and attitudinal profile of respondents on those decisions is analyzed. The profile differences are the same as those obtained for the Logit and Probit models in Table 5. It is therefore confirmed once more that bid price, age, educational level, income and satisfaction determine the decision of whether or not to pay and how much to pay. Moreover, the differences between the parks and the years studied remain. On the other hand, the influence of gender and frequency of use has not been proved.

5. Discussion and Conclusions

This study has focused on estimating WTP and in determining if individuals have a positive attitude towards the good which conditions their payment decisions. Two kinds of regression models were used to achieve these objectives. The use and conservation value attached to suburban parks were calculated by using the Logit and Spike models. In addition, the influence of socio-economic and attitudinal characteristics on WTP was calculated by both the single-stage Logit and Probit models and a two-stage double censored Tobit model.

The results show a homogenous visitor in the suburban parks analyzed and a low willingness to pay for this type of good. This is a logical result in view of the type of good analyzed. These WTP values suggest a certain degree of resistance to the bidding format used (bidding bias) and a lack of familiarity in Spanish society with valuation decisions for public goods, as has previously been indicated by other authors (Del Saz-Salazar and GarcíaMenéndez, 2007; Del Saz-Salazar and Rausell-Köster, 2008). Furthermore, the world economic crisis, which has affected Spain, has brought about a decrease in citizens' income and important budget shortages in the public administrations. Both actors have concentrated their budget efforts on the essentials which make it possible to carry on with their functions.

Moreover, the influence of the socio-economic profile on WTP has been confirmed, the key factors being: young age, having a high level of income and education. Previous studies have shown that income plays a fundamental role in the economic valuation of natural spaces (Togridou *et al*., 2006). Furthermore, other studies have shown that visitors' WTP diminishes with age (Martín-López *et al*., 2007; Lo and Jim, 2010) and increases with education level (Del Saz-Salazar and García, 2007; Majumdar *et al*., 2011). The influence of the attitudinal profile on WTP has also been confirmed, the crucial factor being a high level of satisfaction. Thus, greater satisfaction and social benefits from the user experience are assumed to increase willingness to pay (Affizzah *et al*., 2006; Baral *et al*., 2008). Park managers should therefore aim –through conservation and awareness efforts and quality improvements at the park– to achieve higher levels of satisfaction in visitors and positively influence their behavioral intentions, such as WTP (Yoon and Uysal, 2005).

Furthermore, the results have also shown differences across the parks studied. As previously stated in the parks description, one of the reasons they were chosen was that although both parks share the basic characteristic of periurban spaces, which makes it possible to compare them with each other, they differ in terms of geographical location and certain characteristics. In other words, San Pedro Park is a suburban coastal area and Grajera Park is a suburban wetland. Differences were also observed in the years studied due to the different values studied each year. The 2008 survey analyzes the value of the recreational use of the spaces whereas the 2010 survey studies their conservation value. Finally, it should be pointed out that the two-stage models have shown that the WTP decision is sequential. That is to say, individuals take the decision to pay and how much to pay at different moments in time (García *et al*., 2009).

This study has shown that visitors to natural areas wish to pay low prices for their use and conservation. In spite of these low valuations, it can be seen that socio-economic and attitudinal variables influence responses with regard to WTP. It can thus be concluded that the visitors to the natural areas take into account their personal status and attitudes when they evaluate this kind of public good in economic terms. Given the importance of these individual characteristics in the economic valuation decisions of visitors to the suburban parks, planning strategies should aim to increase the knowledge of the profile of potential visitors. Deepening knowledge about personal profiles could help managers determine which factors are important for individuals to be more environmentally active and thus obtain a higher economic valuation for these resources. Furthermore, managers could design and implement environmental education schemes campaigns (courses, conferences and/or talks) directed at the general public in order to increase their knowledge about suburban parks and to induce changes in individual behavior.

Based on these results, we would therefore stress the fact that environmental economics research should include the consideration of suburban parks as sources of people's psychological and social wellbeing. Communication campaigns (through brochures, tour guides, websites or newsletters) aimed at publicizing the experiences that suburban parks offer to visitors could and should be designed. The communication of these free benefits and services could lead to a decrease in social and economic health costs which citizens have to face. This requires investigation into the range of motivating stimuli that might enable visitors to obtain a positive experience from a visit to the park in order to heighten their perception of the economic worth of conserving the park. Additionally, these campaigns could encourage good word-of-mouth publicity and improve or maintain the competitiveness of the park.

Given the influence of the more classic characteristic of the individuals concerned in their valuations of these public goods, future research could well look into the other motivations which underlie the economic valuations of the visitors to urban and suburban parks. In addition, this work has

focused on the study of visitors by analyzing both recreational value and conservation (non-use). It would therefore also be interesting to analyze the behavior of non-visitors. This may help to compare the differences in decision-making structures between users and non-users with regard to their economic valuation intentions for natural areas. Finally, it would be attractive to apply the study models developed to other public goods (for example: Protected Natural Areas), which would extrapolate the most relevant results to other types of environmental goods.

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Appendix 1

Questions used in the contingent valuation:

Valuation scenario 1 (Survey 2008, recreative value). Park (*), apart from the recreational and sporting services it offers as a place for recreation, also offers numerous other services which you may value, for example the environmental benefits of the oxygenation of the atmosphere, and the health benefits associated with the relaxation that a visit to it provides. For this reason, we would like you to evaluate in monetary terms the satisfaction or welfare that these uses produce for you, that is to say, the monetary value of the good as well as your willingness to financially contribute in order to continue to use the park for recreational purposes. The payment would be made by way of an entrance fee which would be paid by all the users of the park and which would be managed by the autonomous government. Please bear in mind that you are being asked to imagine a real payment and that what you would spend would not be available to be spent on other things.

Valuation scenario 2 (Survey 2010, conservation value). To prevent damage to facilities and loss of plant and animal species, the regional government is interested in designing a sustainable management plan in order to ensure the long-term preservation of the park. It is also interested in promoting the recreational, sports, health and social activities offered by the park and substantially improving the lives of citizens. For this reason we would like you to evaluate in monetary terms the satisfaction or welfare that these uses produce for you, that is to say, the monetary value of the good as well as your willingness to contribute financially to the conservation of the park. The payment would be made by way of an entrance fee which would be paid by all the users of the park and which would be managed by the autonomous government. Please bear in mind that you are being asked to imagine a real payment and that what you would spend would not be available to be spent on other things.

Valuation questions. Taking into account all the possible benefits provided by the area as a whole, would you be willing to pay an entrance fee of X €?

☐ Yes
☐ No

Bearing in mind that you would be willing to pay X €, how much more would you be willing to pay?.....€

Bearing in mind that you would not be willing to pay X €, what is the maximum price you would be willing to pay?.....€

If you are NOT willing to pay, please indicate your reasons by placing an X in the appropriate box.

Reason for unwillingness to pay	**Score**
I already pay enough taxes	
This environmental resource is not worth an entrance fee	
I'm not sure the money would be put to good use	
I think entrance should be free of charge	
I couldn't afford to pay an entrance fee	
Don't know/ no answer	