

Valuation of the recreational use of the Calares del Mundo and Sima Natural Park through the travel cost method

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Abstract

Aim of study: The purpose of this study is to estimate the economic value of the recreational use of a protected natural area. The importance of the study lies in the justification of these valuations due to the use that society perceives from the environmental benefits of these areas as well as to the valuable information for management for public administrators with the aim of checking the budget that they manage.

Area of study: Calares del Mundo and Sima Natural Park (Albacete, Castilla-La Mancha).

Material and methods: With the purpose of determining consumer surplus, 410 surveys were made in August, 2009 and the individual travel cost method was used.

Main results: The value the visitor conceded for the recreational use of the park was 12.58 € and the annual consumer surplus value added for recreational use reached almost 3.5 million euros.

Research highlights: This research emphasizes that the results are along the same lines as those from similar studies carried out in natural areas of Spain as well as in natural areas of other countries.

Key words: natural areas; travel cost method; consumer surplus; Castilla-La Mancha.

Introduction

In recent years, there has been an important increase in the concern by society about problems related to the preservation of our natural heritage and biodiversity. Environmental problems have become a cause of concern to people, particularly those problems involving the degradation of natural areas, whether from industrial or urban developments.

Protected natural areas appeared towards the end of the nineteenth century, their purpose was to protect certain areas and to prevent their degradation. Nevertheless, nowadays, it is not only essential to protect the biophysical environment, but it is also necessary to involve society in order to promote preservation by carrying out cultural, educational, scientific, research, socioeconomic and recreational activities in these areas.

Among the various above-mentioned activities, recreational ones are experiencing a noticeable increase

in demand by people to make use of a top quality environment with a series of services for leisure and the enjoyment of nature.

To satisfy this demand, the Autonomous Community of Castilla-La Mancha has two National Parks (BOE, 1989): Las Tablas de Daimiel, and Cabañeros; six Natural Parks¹: Lagunas de Ruidera, Hayedo de Tejera Negra, Alto Tajo, Barranco del Río Dulce, Serranía de Cuenca, and Calares del Mundo and Sima, besides other less protected areas. Together they occupy a surface area of 316,724 hectares, constituting approximately 4% of the Community surface area.

The Calares del Mundo and Sima Natural Park (Fig. 1) is the most recent one in Castilla-La Mancha (BOE, 2005). It is located in the south-eastern corner of the province of Albacete and occupies a surface area of 19,192 hectares. It is divided among the municipal districts of Cotillas, Molinicos, Riópar, Vianos, Villaverde del Guadalimar and Yeste. The areas that make it up

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¹ Natural and National Parks are two Spanish protected areas, which in the international nomenclature correspond to category II of the International Union for Conservation of Nature (IUCN). Currently both are managed by the Autonomic Administration although at first National Parks were managed by the Central Government.

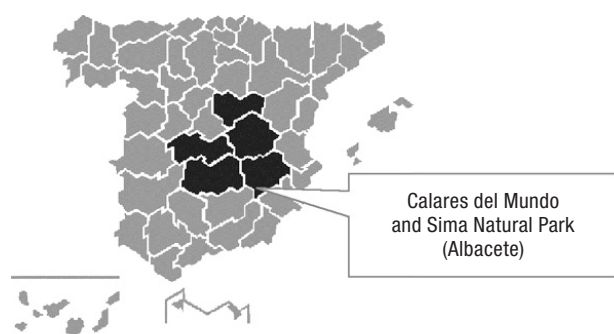


Figure 1. Castilla-La Mancha (Spain).

are denominated Calar del Mundo, Calar de En Medio, Chorros del Río Mundo, Cañada de los Mojones, Sierra del Cujón and Calar de la Sima.

This park is of major importance from the viewpoint of preserving the geological heritage, biodiversity and landscape of Castilla-La Mancha. Besides, it includes certain enclaves, like the Chorros del Río Mundo, which offer a striking recreational function. Special natural qualities favour this enclave such as a spectacular waterfall originating at the mouth of the Chorros cave, about 1,260 metres high with easy accessibility for contemplation. It is essential to estimate the value that people assign it as a key element, which would provide valuable management information that could be useful in making decisions about the protection and conservation policies for the park.

This estimate is based on the fact that the absence of a valuation of these resources may lead to excessive exploitation or the inadequate use of the park. As Krinstrom points out (1995), the main reason for measuring the value of non-market goods is the same as for measuring private goods. That is, a more efficient use will probably be made of such goods if they have a price.

There are two methodological approaches to assess the recreational use of natural areas. The first one comprises direct methods such as contingent valuation where a hypothetical market is created for a non-market good and the value is obtained that individuals assign it. Through the second approach, made by indirect valuation methods, a demand function is approximated by observing the real behaviour of the consumer who acquires market items related to the environmental goods and services under estimation.

Bearing in mind this second approach, the travel cost method (TCM) was the first technique proposed to assess non-market goods and services. Its origin was found in an enquiry made by the United States Natural Park Service to ten experts to suggest valuation techni-

ques for the existence of these parks, and to compare them to the benefits of using such areas for alternative purposes. One of the experts consulted, Harold Hotelling, answered the petition in 1947 in a letter describing the essence of what would later be called the Travel Cost Method.

In short, the method consists of associating the travel cost to the supposed cost of visiting a natural public area. Thus, it is possible to estimate a demand function that includes a measurement of the economic well-being derived from the use of the park.

The first studies using this method were carried out in the sixties. They were applied to problems with access that arose due to federal government intervention in the development of water resources and land ownership. Clawson and Knetsch were the first economists to introduce the technique formally, in 1966, known as the travel cost method from the original idea by Hotelling.

In the seventies and the beginning of the eighties, after ensuring the method was good for estimating the value of the recreational services provided by natural areas, it began to be applied for measuring the variation in value of these recreational services in the face of environmental quality changes.

A large number of applications of the TCM have been developed in the last thirty years. In Spain the method has been applied, among others, by: Garrido *et al.* (1996) to estimate the use of the Cuenca Alta del Manzanares Regional Park; Pérez y Pérez *et al.* (1996a) for the Ordesa and Monte Perdido National Park; Pérez y Pérez *et al.* (1996b) for the Señorío de Bertiz Natural Park; Del Saz and Pérez y Pérez (1999) to estimate the use of the Albufera Natural Park; Judet *et al.* (2002), for the Tablas de Daimiel National Park; Farré (2003) for the Aigüestortes and Estani de Sant Maurici National Park; García and Colina (2004) to evaluate the recreational use of the Somiedo Natural Park; and Hidalgo (2011) to estimate the provincial natural heritage of Cordoba.

This method is based on the weak complementarity relation between the visit made to one or more recreational sites and the cost of getting there. This weak complementarity relation implies that the environmental value of the good can be none other than a use-value. Therefore, this method, unlike the direct contingent valuation method, cannot estimate non-use values, which implies a greater limitation to the method.

Even if the entry price to a natural area were zero, the visitor would still have certain costs to enjoy it: the

travel expenses originated by his trip. So each visit bears in itself an implicit transaction: the access price to such a natural area is exchanged for the recreational services it offers the visitor. At the same time, different individuals assume different travel expenses.

Finally, the aim of the method is to estimate how the demand for the environmental good changes with regard to variations in the cost of enjoying it. This information allows the estimation of a demand curve for the good. Starting from that estimation, changes in the consumer surplus can be analyzed which a modification in the good would cause. The value of the recreational services provided by the natural area is the area under the demand curve added to the number of individuals entering it.

Thus, the purpose of this research is to obtain the economic value of the recreational use of the Calares del Mundo and Sima Natural Park by applying the indirect Travel Cost Method and by starting from the specification of a demand function to calculate consumer surplus.

Material and methods

The model

According to Freeman (1993) there is only one place available to visit, and all visits are of the same duration. Individual utility is also assumed as depending on the total amount of time spent at the location, the quality of the location and the quantity of a cash good. With the length of each visit determined by simplicity, then the time of permanence at a location can be represented by the number of visits. Thus, the individual solves the following utility maximization problem:

$$\text{Max } u(X, r, q) \quad [1]$$

subject to budget and time restrictions:

$$M + p_w t_w = X + cr \quad [2]$$

$$t^* = t_w + (t_1 + t_2) r \quad [3]$$

where:

X = the amount of the cash good whose price is 1

r = number of visits to location

q = environmental quality of location

M = income (exogenous)

p_w = salary range

t_w = hours worked

t^* = total discretionary time

c = monetary travel cost

t_1 = travel time

t_2 = time of stay at the location

Assuming that r and q are now complementary in the utility function, this means that the number of visits will increase according to the locations environmental quality.

The time constraint reflects that both the time of travel to the location and the time of the stay are at the expense of other activities. Therefore, there is an opportunity cost of the time dedicated to the recreational activity. There is also the assumption that individuals are free to choose the amount of time that they want to dedicate to work and that their work does not directly convey utility (or disutility). Thus, the opportunity of cost time is the salary rate. Finally, it is assumed that the monetary travel cost to the location has two components: the entry price f (which could be zero), and the travel expense. The latter is $p_d d$, where p_d is the travel cost per kilometre and d is the round trip distance to the location.

By substituting the budgetary constraint for the time constraint, a sole constraint would be obtained:

$$M + p_w t^* = X + p_r r \quad [4]$$

where p_r is the total cost of a visit and is given as:

$$p_r = c + p_w (t_1 + t_2) = f + p_d d + p_w (t_1 + t_2) \quad [5]$$

As equation [5] clearly shows, the total cost of the visit comprises four components: entry fee, monetary travel cost, the cost of travel time to the location, and the cost of the time of the stay at the location. Since it has been assumed that individuals can freely choose the number of hours they wish to work, both time costs are assessed at the salary rate.

Maximizing equation [1] subject to the constraints described in equation [4], the individual demand equation is obtained for visits to the location:

$$r = r(p_r, M, q) \quad [6]$$

The main characteristic of this method is using travel cost as an approximation to the price of the recreational activity. That is, travel cost is used as substitute prices, and variations in them cause changes in consumption. Therefore, the observation of joint price variations, consumption, and some quality characteristics constitute the essential component in the process of estimating the demand function, and the derivation of the measure of the change in well-being (Bockstael *et al.*, 1991).

Two different method options have been developed to estimate the demand function: the zonal travel cost

method², and the individual travel cost method. As Azqueta indicates (1994), the latter is preferred theoretically due to a greater quality in the results. It is the method used in the present paper.

The individual modality of the travel cost method intends to find the demand of each particular individual for recreational services at a certain natural area. This way not only does it include the cost of access, but also other additional information revealed by the individual. The individual demand function can be expressed by using the example specified by Layman *et al.* (1996), as:

$$V_{ij} = f(C_{ij}, Y_i, D_i, Q_i, S_{ij})$$

where:

V_{ij} = number of visits one individual makes to the nature reserve during a period of time

C_{ij} = cost to individual i to reach location j

Y_i = income of individual i

D_i = vector of sociodemographic characteristics for individual i

Q_i = vector of specific quality characteristics of the location

S_{ij} = the cost for individual i to visit alternative locations to j

Data gathering

During the month of August 2009, 410 visitors to the Chorros del Río Mundo enclave, part of the Calares del Mundo and Sima Natural Park, were personally surveyed for this research. The survey distribution in regard to where questionnaires were carried out is as follows: 80 surveys in the parking lot at the park entrance; 75 on the path between the parking lot and the

first lookout point; 107 at the first lookout point; and finally, 148 surveys at the second lookout point. From the survey it was determined that 63.4% of the visitors were on vacation, 32.7% were making a one day trip, and 3.9% were just passing through.

Stratified random sampling was carried out with proportional allocation by gender and age group (18 to 24 years, 25 to 34, 35 to 49, 50 to 64, and over 64), for an error level under 5% and a 95.5% confidence level ($p = q = 0.5$; $k = 2$). Previous to field work a pre-test was given to 25 people (Table 1).

The final questionnaire, which appears in Annex 1, was organised into five groups of questions to obtain information on: 1) characteristics of the visit to the park, with special relevance to costs, 2) maximum willingness to pay for an entry fee, 3) preferences for various services, 4) several statements about lifestyle and 5) socioeconomic characteristics of the visitor.

From a methodological viewpoint a series of decisions were made to analyse the data from the surveys correctly. So, of the 410 surveys to estimate the demand function to calculate consumer surplus, 28 were excluded because:

a) Some visitors went to see an additional location (multipurpose visitors). As Freeman (1993) points out, if the purpose of the trip is to visit 2 or 3 places, the travel cost should be divided among the various locations to avoid overestimating consumer surplus. The difficulty lies in verifying which part of the travel cost is attributable exclusively to each location visited. In this sense, García and Colina (2004) indicate that another possible alternative consists of eliminating all multipurpose visitors from the analysis. In this research, multipurpose visitors, who declared that their main purpose for the trip was not to visit the park, were excluded. That implied seventeen surveys.

Table 1. Technical card

Ambit	Calares del Mundo and Sima Natural Park (Albacete, Castilla-La Mancha)
Universe	Visitors to Natural Park
Survey size	410 surveys
Survey error	< 5.0%
Level of confidence	95.5% ($k = 2$)
Sampling	Random stratified with proportional affixation by gender and age
Control	Of coherence and stability
Preliminary questionnaire	Pretest to 25 individuals
Field work	August, 2009

² Where the dependent variable is defined as the number of visitors to the natural area coming from a certain area divided by the population of that area.

b) Visitors on vacation in the area whose habitual residence is outside the Peninsula, since the cost of plane tickets is quite variable. Four surveys were involved.

c) Observations on some of the relevant variables for estimating the demand function were missing, such as the number of vacation days in the area. That implied six surveys total.

Another methodological issue to consider was assigning a travel cost to different types of visitors. Three visitor categories have been established according to the type of trip that they were taking:

a) For day visitors, who make the trip from their habitual residence and return on the same day, the travel cost was calculated from the distance travelled (km) that day.

b) For visitors on vacation near the park who were residing outside their habitual residence, the assigned cost was not only from the day of the visit, but also the result was added from dividing their total travel cost by the number of days that their trip lasted.

c) Finally, for visitors just passing through, who were on a vacation itinerary that included visits and stays at other locations, the total travel cost was divided by half of their daily expenses.

Table 2 shows the number of each type of visitor and the average distance travelled to reach the park. Over 96% of the one-day visitors travelled less than 100 km, while 81% of the visitors on vacation travelled over 100 km. Visitors just passing through represented only 2.36% of the total visitors.

The next methodological matter to address referred to what type of costs should be introduced into the demand function. Calculating the travel cost included estimating the actual cost associated with consumption in monetary units incurred by the individual to travel to the location under study, and calculating the opportunity cost of time for travel and for the visit.

There is a lot of controversy in the literature on the advisability of including travel time or not. There are visitors who consider travel time as a benefit, who enjoy observing the landscape in their leisure time, so it should not be considered a cost. They should be differentiated from visitors whose travel offers no utility.

To make this differentiation, a question must be included in the survey about whether visitors enjoyed the trip or not, as in research done by Del Saz and Pérez (1999), and García and Colina (2004).

Several studies carried out in Spain have assumed that the time cost spent on the trip should be estimated as a percentage of what the surveyee earns per hour in his professional life. Some papers assume the value of travel time as 10% of the hourly wage (Pérez y Pérez *et al.*, 1996b), or 15% (Júdez *et al.*, 2002), or 25% (Riera *et al.*, 1994; González, 2000), or 30% (Farré, 2003), or 45% (Abad *et al.*, 2003) or 50% (Garrido *et al.*, 1996).

If people are free to choose their working hours, then the value of their free time is clearly determined by the salary increase they would not receive by not dedicating this time to work. But in reality schedules for work and time off are imposed for most people. As Larson (1993) points out, it would be correct to use a portion of their salary as time value only for those people who can freely choose their optimal labour-leisure combination and who feel a disutility when working. (Working does not give them satisfaction.)

In the sample for this current research, approximately 65% of the surveyees were employees whose leisure time is predetermined. For this reason and considering it the most conservative hypothesis³, it was decided not to include the travel time cost. Other papers where it was not taken into account either are tho-

Table 2. Visitor type and average distance travelled

Visitor type	Visitors		Average distance travelled (km)	0-100 km (%)	> 100 km (%)
	Num.	%			
Day trip	236	61.78	33.62	96.2	3.8
Vacations	137	35.86	154.39	18.0	81.0
Passing through	9	2.36	126.89	55.5	44.5
Total	382		79.13	67.5	32.5

³ García and Colina (2004) point out that due to the great sensitivity shown by consumer surplus in the presence of each of these elements, it is advisable to lean always towards the rather conservative hypotheses. Their advice has been followed in this paper.

se by Del Saz and Pérez y Pérez (1999), García and Colina (2004), and Hidalgo (2011).

Finally and as usual in such research, the cost associated to the time spent in the park has not been included as cost, since the time spent on recreational and leisure activities is generally perceived by the visitor as satisfaction.

Besides, if we examine the time spent on the visit, which deals with a personal decision subject to monetary and time constraints, depending on leisure availability, the opportunity cost would be the supplementary benefit furnished by an alternative visit. Nevertheless, if someone chooses to visit this area, it is the one considered to contribute the greatest satisfaction, which eliminates other options. In this case, zero opportunity cost should be used for the length of the visit (Ruiz *et al.*, 2001).

Therefore, the real cost consists of travel cost plus overruns (Hidalgo, 2011). Travel cost in turn is made up from the expenses directly originated by the trip: fuel consumption, purchase of a public transportation ticket or vehicle rent. It deals with the unavoidable expenses derived strictly from the trip. As Azqueta (1994) points out, some authors include the concept of countable vehicle amortisation as an additional cost, but a private vehicle will depreciate practically just as much whether it makes the trip or not. So, vehicle amortisation has not been included as a cost in this research.

In the present paper, the travel cost has been deemed at 0.082 €/km, which corresponds to the consumer perceived cost and implies taking only fuel into account⁴. For visitors who went by motorcycle, the cost in Euros per kilometre was divided in half. For visitors on vacation in the area who accessed the park on foot or by bicycle, the cost taken into account was the result of dividing their total travel cost by the number of days their vacation lasted.

Overrun, the second component of the real cost, includes expenses derived from the visit other than travel expenses, for example food and shelter. That is, the total costs would be imputed to what visitors declared they had paid exclusively to visit the natural area. Nonetheless, the same as most of the studies to date, this research has not included costs derived from food or shelter.

Results

Demand function estimation

To calculate consumer surplus the annual demand function of visits to the Calares del Mundo and Sima Natural Park must be estimated, where the dependent variable, the number of visits to the park per time period, is a discrete variable that adopts only a few positive whole number values. In these cases, the use of continuous distribution models could lead to biased estimates of parameters for consumer surplus (Hellerstein and Mendelsohn, 1993).

Besides, when conducting the surveys *in situ*, individual observations were obtained for those where the dependent variable was truncated and censored at one, since it is impossible to observe less than one visit. Potential users were not taken into account, so non-participants were not observed.

In the case of our sample, 89.00% of the 382 surveyees declared that they had visited the park only once in the previous twelve months. So, the dependent variable showed relatively few values other than one.

Although in the literature the estimation of the demand function is frequent through ordinary least squares, some authors such as Maddala (1983) and Hanley and Spash (1993), point out that in these cases the use of ordinary least squares might lead to an overestimate of the magnitude of consumer surplus. Therefore, using them is inappropriate.

Consequently it is more appropriate to resort to estimating the regression coefficient through maximum likelihood (Bockstael, 1995) and to use non-negative discrete dependent variable models. The type of probability distribution that the dependent variable might follow would be a Poisson distribution (if the determined sample mean of the explained variable is equal to its determined variance) or the negative binomial (if this variable shows overdispersion).

The basic structure of a Poisson model is as follows. If Y is a random variable with a discrete distribution, and assuming that Y can take any non negative whole number value, Y is said to have a Poisson distribution with the mean λ (λ being > 0) when the probability function of Y is the following:

⁴ The average car consumption and price of fuel during the year 2009 was taken into account to calculate the cost of 0.082 €/km. Other calculation options would be: a) to consider the kilometer cost from other papers, b) according to travel allowances stipulated by the Authorities and c) to consider the cost declared by the visitor.

$$\text{Prob} (Y = y_i) = \frac{e^{-\lambda_i} \lambda_i^{y_i}}{y_i!} \quad \text{para } y = 0, 1, 2, \dots$$

where y_i corresponds to the number of visits observed for the i -ith individual:

$$\ln \lambda_i = \beta X_i$$

β being the parameters to estimate and X_i a vector of the socioeconomic characteristics that determine the average visits to the park. In this distribution λ_i is both the mean and the variance of the number of visits.

The negative binomial distribution is a generalization of the Poisson model where the assumption of an equal mean and variance is weakened (Cameron and Trivedi, 1998).

In this research a negative binomial distribution model has been used after confirming the presence of overdispersion⁵. Both Pérez y Pérez *et al.* (1996a) and Del Saz and Pérez y Pérez (1999) estimated several models with a Poisson distribution and a negative binomial distribution. They concluded that a negative binomial distribution adapted better to their data.

As Navarro *et al.* (2001) pointed out, thinking that the dependent variable follows a Poisson distribution when there is actually overdispersion might cause some variables to be considered significant when they really are not. Therefore, it might lead to applying operations on variables that are not really influential.

Five initially valid variables were obtained⁶ from the data gathered from the surveys to visitors to estimate the recreational demand models for the park. And so, the estimated demand function can be expressed as follows:

$$\text{TRIPS} = \beta_0 + \beta_1 \text{COST} + \beta_2 \text{HP} + \beta_3 \text{PR} + \beta_4 \text{G} + \beta_5 \text{TV}$$

where:

TRIPS = are the number of trips made to the park in the last twelve months.

COST = is the travel cost, *i.e.* round trip travel expenses in going to the park and returning to their residence. This expense is obtained by assigning a standard cost per kilometre. Taking into account the occupancy of each vehicle (data collected from the survey), travel cost = [distance (km) $\times$ 2 / number of persons in the car] $\times$ 0.082 €/km.

- HP = is the continuous variable that includes the number of hours spent in the park during the visit.
 PR = is the discrete variable that represents the place of habitual residence of the surveyee.
 G = is the dichotomous variable that takes the value of 1 if the surveyee is male and 2 if female.
 TV = is the discrete variable that indicates whether the surveyee is on a day trip, on vacation in the area or just passing through.

Table 3 shows the results of the demand function, estimated through the negative binomial distribution, obtained using the STATA program (2007).

Calculation of consumer surplus

The estimated demand function is in reality a probability distribution of the number of trips, whose prospect indicates the number of visits per cost. Therefore, to obtain the expected value of consumer surplus it is necessary to integrate under the demand curve (Hellerstein and Mendelsohn, 1993), calculating it by using the following expression:

$$E [EC] = -\lambda/\beta_1$$

where:

λ = is the mean or prospect of the number of trips. In this research it took the value of 1.16 trips

Table 3. Estimated coefficients through negative binomial distribution for the demand function in the travel cost method

Variable	Coefficient
Constant	-0.8061 (0.9387)
COST	-0.0922** (0.0434)
Hours spent in the Park (HP)	0.3055*** (0.1057)
Place of Residence (PR)	-0.0068* (0.0036)
Gender (G)	-0.7393** (0.3646)
Visitor Type (TV)	0.3481** (0.1755)

Log-L = -56.518; $LR\chi^2 = 22.71$; $\text{Prob} > \chi^2 = 0.0019$; Alpha = 2.6717; Likelihood-ratio test of alpha=0. Chibar2(01)=20.56; $\text{Prob} > \text{chibar2} = 0.000$. Standard error in parentheses. ***, ** and * indicate the existence of significant differences for a maximum error level of 1%, 5% and 10%, respectively.

⁵ Both a Poisson distribution model and a negative binomial distribution model were tested. The best fit was observed in the latter model through the alpha parameter, which indicates the presence of overdispersion. The ratio from the "likelihood ratio test" turned out to be clearly significant. The highest logarithm value from the likelihood test (Log-L) was chosen.

⁶ Other variables taken into account but that did not turn out to be significant are: family income, age, work activity, degree of satisfaction with the visit, amount of people met during the visit, knowledge of another area that produces the same degree of satisfaction as this park, main reason for the visit, and belonging to an association to preserve nature.

β_1 = is the coefficient that accompanies the COST variable

Substituting in the previous formula, we obtained:

$$E [EC] = -\lambda/\beta_1 = -1,16/(-0,0922) = 12,58 \text{ €}$$

Aggregation of individual appraisals

Finally, individual appraisals have been aggregated to obtain the social benefits derived from the use of the park in 2009 starting with its recreational use. Taking into account that the number of visitors to the park in 2009 was 275,711, the estimated value of the recreational use of the Natural Park was 3,468,444.38 € according to the 2009 Report on the Calares del Mundo and Sima Natual Park (Organismo Autónomo de Espacios Naturales de Castilla-La Mancha, 2010).

Discussion

Demand function estimation

The estimated coefficient signs were as expected (Table 3). The influence of the COST variable was consistent with what occurred in other research where this valuation method was applied. The negative sign implies that cost has a negative influence on the number of visits made to the natural area.

The positive sign of the HP variable, duration of the stay, indicates that people who stay longer in the park, probably because they like it more and want to enjoy the area longer, are willing to make a greater number of visits there. This result coincides with what was obtained by Del Saz and Pérez y Pérez (1999). Nonetheless, García and Colina (2004) obtained a negative sign for this variable and indicated that shorter visits are associated with people who have a greater opportunity to visit the park due to their lower travel costs. The latter did not occur in our case.

The PR variable, place of residence, showed a negative sign. This might indicate that the farther the place of residence is from the park, the lower the number of visits people are willing to make. This result coincides with what was obtained by Pérez y Pérez *et al.* (1996b).

The negative sign of the gender related variable (G) informs us that men visit the park more frequently, as happened in research by García and Colina (2004) and by Escobar and Ramírez (2009).

Finally, the fact that the TV variable (type of visitor) is positive means that visitors who are making a one day trip are willing to make more visits than those on vacation in the area. This is probably due to the fact that they reside closer to the park, so it is easier for them to make such visits. Whereas visitors on vacation in the area prefer not only seeing the park, but also the entire surrounding area.

Calculation of consumer surplus

The consumer surplus value (12.58 €) obtained through the travel cost method turned out to be 3.13 times higher than what Samos and Bernabéu (2011) obtained (4.02 €) for this same park by using the contingent valuation method. Nevertheless, these results coincide with most of the research conducted in Spain until now, where the use-values obtained through the indirect method are higher than those estimated by using the direct method.

Some examples are the research papers⁷ by Pérez y Pérez, *et al.* (1996a; 1996b), González (2000), Ruiz *et al.* (2001), Júdez *et al.* (2002), Farré (2003), García and Colina (2004), Castillo *et al.* (2008), and Hidalgo (2011). Research by Riera *et al.* (1994) must be emphasized, where the ratio of 3.07 is very similar to what was obtained in this paper. Also noteworthy is the research carried out by Del Saz and Suárez (1998) and Del Saz and Pérez y Pérez (1999) where the ratio coincides with what this paper obtained (3.13).

In addition, Carson *et al.* (1996) did a meta-analysis on 83 papers where they compared the value estimations obtained by revealed preference techniques as opposed to the estimations obtained through the contingent valuation method. They reached the same conclusions and obtained a (revealed preferences over contingent valuation) ratio of 2.62.

Likewise, the consumer surplus value obtained in this research can be compared with the values obtained through other previous applications carried out in Spain (Table 4).

⁷ The ratio was calculated by comparing the value of the travel cost method over the value from the contingent valuation method. The most conservative estimations obtained by each paper were used.

Table 4. Travel Cost applications in previous papers in Spain

Autors (year)	Valued natural area	Sorplus obtained (€)
Riera <i>et al.</i> (1994)	Pla de Boavi (Lérida)	8.36-12.54
Loureiro and Albiac (1994)	Dehesa del Moncayo Na.P. (Zaragoza)	29.71
Campos <i>et al.</i> (1996)	Monfragüe N.P. (Cáceres)	6.13
Pérez y Pérez <i>et al.</i> (1996a)	Ordesa and Monte Perdido N.P. (Huesca)	7.70-24.11
Pérez y Pérez <i>et al.</i> (1996b)	Señorío de Bertiz Na.P. (Navarra)	5.39-11.33
Garrido <i>et al.</i> (1996)	Cuenca Alta del Manzanares R.P. (Madrid)	33.60-277.66
Del Saz and Pérez y Pérez (1999)	La Albufera Na.P. (Valencia)	11.07-40.43
González (2000)	Monte Aloia Na.P. (Pontevedra)	3.78-5.42
Riera (2000)	Natural areas (Mallorca)	29.65-52.26
Ruiz <i>et al.</i> (2001)	Sierra de Cardena and Montoro Na.P. (Córdoba)	12.96-19.63
	Sierra de Hornachuelos Na.P. (Córdoba)	23.23-45.23
	Sierras Subbéticas Na.P. (Córdoba)	9.22-66.30
Júdez <i>et al.</i> (2002)	Tablas de Daimiel N.P. (Ciudad Real)	2.84
Bengochea (2003)	Desierto de las Palmeras Na.P. (Castellón)	0.75
Farré (2003)	Aiguestortes and Estany de Sant Maurici N.P. (Lérida)	41.41-98.75
García and Colina (2004)	Somiedo Na.P. (Asturias)	15.55- 24.79
Vidal <i>et al.</i> (2004)	Sierra Espuña R.P. (Murcia)	1.05-6.43
Castillo <i>et al.</i> (2008)	Sierra de María-Los Vélez Na.P. (Almería)	7.67-13.29
Hidalgo (2011)	Sierra de Cardena and Montoro Na.P. (Córdoba)	65.14
	Sierra de Hornachuelos Na.P. (Córdoba)	19.86
	Sierras Subbéticas Na.P. (Córdoba)	40.39
	Laguna del Rincón N.R. (Córdoba)	2.09
	Laguna de Zóñar N.R. (Córdoba)	4.89
	Cueva de los Murciélagos N.M. (Córdoba)	8.46

N.P.; National Park. Na.P.: Natural Park. R.P.: Regional Park. N.R.: National Reserve. N.M.: National Monument.

A certain similarity is observed among these values, with the consumer surplus value falling into similar ranges. At any rate, a wide variety of results is established depending on the model. As Randall (1994) pointed out, measures of well-being obtained through this method are very sensitive to the analytical criteria discretely chosen by researchers.

The value obtained by Bengochea (2003) in the Desierto de las Palmeras Natural Park turns out exceptionally low. It turns out to be a logical value, since travel distances are short and, consequently, the unitary cost of the visit is low. On the contrary, Garrido *et al.* (1996) obtained high values for the Cuenca Alta del Manzanares Regional Park. But they themselves conclude that their consumer surplus valuations are debatable due to statistical inaccuracy and the implausibility of such high values.

Aggregation of individual valuations

The total annual value of the consumer surplus for recreational use, calculated by applying the travel cost method, rises to 3,468,444.38 €. This figure is much higher than what Samos and Bernabéu (2011) obtained (1,108,358.22 €) for this same park by using the contingent valuation method.

The recreational use values obtained through other travel cost applications made at protected natural areas in Spain have been unequal. The value from the present research, approximately 3.5 million Euros, lies at the mean of the results from other papers.

Therefore, research by Pérez y Pérez *et al.* (1996a) are among the papers that obtained higher values than this research did. In their research on the Ordesa and Monte Perdido National Park, they obtained an

approximate value of 5 million Euros. Del Saz and Pérez y Pérez (1999) obtained a value of 7.7 million Euros for the Albufera Natural Park. And Farré (2003) obtained a value of 11.5 million Euros for the Aigüestortes and Estany de Sant Maurici National Park.

On the other hand, García and Colina (2004) obtained a somewhat lower value (1,166,250 €) for the Somiedo Natural Park. That might be because the number of visitors in the year that research was conducted was 75,000 lower than for other papers.

Lastly, social benefits associated with the recreational use of the Desierto de las Palmeras Natural Park obtained by Bengochea (2003) were nearly 800,000 €, since the consumer surplus was only 0.75 €.

Conclusions

The recreational use value of the Calares del Mundo and Sima Natural Park was estimated through the application of the individual travel cost method. The most conservative hypothesis was chosen at all times to calculate consumer surplus, since one of the inconveniences of this method is the great sensitivity of the result to the methodological criteria used by the researcher. This in turn constitutes one of the weaknesses of the method.

The consumer surplus value reached 12.58 €, a similar result to that obtained in other papers using the travel cost method in Spain. At the same time, this result is higher than what was obtained for this same park when applying the contingent valuation method. This is common of the results of most research that used both methods.

The recreational use value of the park was calculated from the consumer surplus, obtaining a value of 3,468,444.38 €, similar to that of other papers in Spain.

The road left to travel is still long. On the one hand, in addition to the benefits derived from the recreational use of these natural areas it is necessary to estimate their existence values. And on the other hand, the opportunity costs of not using these natural parks for alternative uses should be calculated.

Finally, a fundamental limitation to this method is its inability to estimate non-use values. Therefore other methods should be resorted to in order to calculate, for example, the existence value.

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ENCUESTA A VISITANTES AL P.N. DE LOS CALARES DEL RÍO MUNDO Y DE LA SIMA

Buenos días/tardes. La Universidad de Castilla-La Mancha está realizando una encuesta sobre el uso recreativo del Parque Natural de los Calares del río Mundo y de la Sima. Usted ha sido elegido completamente al azar y la encuesta es totalmente anónima. Pedimos su colaboración contestando a las siguientes preguntas. Muchas gracias.

Fecha: _____ Hora: _____ N° encuesta: _____
Encuestador: _____

1. ¿Qué actividades va a realizar (o ha realizado) hoy en el Parque?
Elige un máximo de tres.

- ☐ Observación flora-fauna ☐ Senderismo ☐ Subir a la cueva
☐ Actividades relajantes ☐ Espeleología ☐ Comida campo
☐ Fotografía y video ☐ Otras: _____

2. ¿Cuántas horas va a permanecer (o ha permanecido) en el Parque? _____ horas

3. ¿Qué otras zonas del Parque conoce? _____

4. ¿Cuántos kms ha hecho hoy para llegar al Parque? _____ kms

5. ¿Cómo ha viajado hoy hasta el Parque?

- ☐ Coche particular con _____ adultos y ☐ Otros:
niños (<18)

6. ¿Es visitar el Parque el único motivo de su viaje de hoy?

- ☐ Sí ☐ No

7. ¿Qué otros lugares, fuera del Parque, ha visitado o piensa visitar hoy? _____

8. Y dentro del Parque, ¿qué otras zonas ha visitado o piensa visitar hoy?

- ☐ Tus ☐ Calar del Mundo ☐ Calar de En Medio
☐ Cañada de los Mojones ☐ Sierra del Cujón
☐ Calar de la Sima ☐ Otros: _____

9. En su opinión, durante su visita se ha encontrado con:

- ☐ Poca gente ☐ Adecuada gente ☐ Demasiada gente

10. ¿Qué grado de satisfacción le ha producido su visita al Parque?

- ☐ 1-Nada ☐ 2-Poca ☐ 3-Normal ☐ 4-Bastante ☐ 5-Mucha

11. ¿Viene hoy de su domicilio habitual?

- ☐ Sí (ir a pregunta 14) ☐ No (ir a 12)

12. ¿Podría decirnos dónde y en qué tipo de establecimiento se ha alojado? Municipio _____

- ☐ Hotel ☐ Camping ☐ Casa rural
☐ Autocaravana ☐ Pensión/albergue ☐ Otros: _____

13. ¿Podría decirnos cuánto le ha costado?

- ☐ Individual: _____ €. ☐ Grupo: _____ €. (_____ personas)

14. ¿Ha traído comida de casa o comerá en un restaurante?

- ☐ Comida de casa ☐ Restaurante/bar

15. ¿Ha comprado o piensa comprar.....?

- ☐ Guías ☐ Recuerdos ☐ Merchandising: ☐ Alimentos típicos
decorativos gorras, camisetas,... de la zona

16. ¿Está usted pasando sus vacaciones en esta zona de la Sierra de Albacete, está de paso o es un viaje de un día desde su domicilio?

- ☐ Vacaciones (Ir a 17) ☐ De paso (Ir a 18) ☐ Viaje 1 día (Ir a 19)

PREGUNTAR A VISITANTES DE VACACIONES (y de paso):

17. ¿Cuántos días está pasando en esta zona de la Sierra? _____ días

18. Y durante estas vacaciones, ¿cuántas veces, incluida ésta, piensa visitar el Parque? _____ veces

PREGUNTAR A TODOS LOS VISITANTES:

19. Durante los últimos doce meses, ¿cuántas veces ha visitado el Parque? _____ veces, de las que:

- _____ veces fueron en viajes de un día desde su domicilio habitual
_____ veces fueron pasando sus vacaciones en esta zona de la Sierra
_____ veces fueron estando de paso por esta zona de la Sierra

20. ¿Cuál es el motivo principal que le ha impulsado a visitar el Parque?

- ☐ Desconocimiento ☐ Recomendación ☐ Tranquilidad
☐ Cercanía ☐ Trabajo ☐ Otros: _____

21. ¿En qué otros lugares puede llevar a cabo las actividades que realiza en el Parque? _____

22. ¿Conoce algún otro espacio natural que le produzca el mismo grado de satisfacción que este Parque?

- ☐ Sí, ¿cuáles? _____ (Ir a 23) ☐ No (Ir a 25)

23. ¿Qué distancia debe recorrer para llegar a esos lugares desde su domicilio habitual? _____ kms.

24. ¿Qué características del Parque le han llevado a elegirlo frente a otros posibles espacios naturales alternativos?

- ☐ Belleza paisajística ☐ Diversidad ☐ Dolinas y cueva
☐ Otros: _____ ☐ Ninguno

25. Valore de 1 a 5 su nivel de acuerdo o desacuerdo con la siguiente propuesta (1 totalmente en desacuerdo y 5 totalmente de acuerdo): Se decide trasladar el aparcamiento desde donde está a una zona cercana (Puerto del Arenal) para disminuir el deterioro del Parque y evitar los atascos. Desde esa zona se realizaría la visita a pie o en transporte público. 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐26. ¿Y si cerca del nuevo aparcamiento se acondiciona un área recreativa? 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐

27. ¿Cuál de estas mejoras le parece más interesante? Elija tres.

- ☐ Instalación de ☐ Itinerarios ☐ Visitas guiadas al parque
observatorios de fauna señalizados (con coste para el visitante)
☐ Material divulgativo ☐ Paneles ☐ Otros: _____
interpretativos

El P.N. de Los Calares, le produce una satisfacción por el uso que hace del mismo, al igual que se la puede producir muchas otras cosas por las que debe pagar. A continuación le vamos a pedir que intente valorar en dinero la satisfacción que le ha producido su visita al Parque.

28. Suponiendo que para acceder al Parque hubiese un precio de entrada, además de los gastos en los que ya ha incurrido, ¿estaría dispuesto a pagar la cantidad de 4 €?

- ☐ Sí (ir a preg. 29) ☐ No (ir a preg. 30)

29. Teniendo en cuenta que pagaría 4 €, ¿cuál sería la cantidad máxima que estaría dispuesto a pagar? _____ €. (ir a preg. 32)

30. Teniendo en cuenta que no pagaría 4 €, ¿cuál sería la cantidad máxima que estaría dispuesto a pagar? _____ €. (Si ≠ 0 €, ir a 32)

31. (Sólo si da 0 €), ¿Por qué motivo no está dispuesto a pagar? _____

32. ¿Piensa usted que el Parque cumple otras funciones además de las recreativas?

- ☐ Sí (ir a preg. 33) ☐ No (ir a preg. 35)

Además del uso recreativo que Usted ha hecho, el Parque cumple otras funciones ambientales, la conservación de la flora y fauna, la recuperación de especies amenazadas, etc.

33. ¿Estaría dispuesto a contribuir económicamente a la conservación del Parque, para que pueda seguir cumpliendo todas estas funciones además de las estrictamente recreativas?

- ☐ Sí (ir a preg. 34) ☐ No. ¿Motivo? _____ (ir a preg. 35)

34. ¿Cuál sería la cantidad máxima anual con la que estaría dispuesto a contribuir? _____ €.



ENCUESTA A VISITANTES AL P.N. DE LOS CALARES DEL RÍO MUNDO Y DE LA SIMA

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ESTILO DE VIDA:

35. Valore de 1 a 5 su nivel de acuerdo o desacuerdo con las siguientes afirmaciones (1 Totalmente en desacuerdo y 5 totalmente de acuerdo).

Hago deporte regularmente..... ☐
 Me preocupo por mi salud..... ☐
 Me gusta disfrutar de la buena mesa..... ☐
 No fumo ☐
 Practico una alimentación sana ☐
 Chequeo voluntariamente mi estado de salud ☐

Tengo con frecuencia reuniones con amigos..... ☐
 Mi tiempo libre lo dedico a viajar..... ☐
 Prefiero viajar en viajes organizados ☐
 Prefiero viajar por España que salir al extranjero ☐

Tengo bastantes conocimientos sobre el efecto invernadero ☐
 Tengo bastantes conocimientos sobre contaminación ☐
 Tengo bastantes conocimientos sobre la lluvia ácida ☐
 Tengo bastantes conocimientos sobre energías renovables..... ☐
 Tengo bastantes conocimientos sobre desertización ☐

Colaboro con ONGs..... ☐
 Me preocupan los problemas sociales (paro, sanidad, etc) ☐
 Me intereso por la información relacionada con el medio ambiente ☐
 Utilizo internet para buscar información sobre temas que me interesan ☐
 Trato de comprar productos respetuosos con el medio ambiente . ☐
 Arrojo la basura en contenedores selectivos (papel, vidrio, pilas,...) ☐
 Considero que la civilización actual está destruyendo la naturaleza ☐

MEDICIÓN DE PREFERENCIAS:

47. En una elección real del espacio natural que desea visitar, cómo calificaría usted a los siguientes espacios según su orden de preferencia en una escala de 0 a 10, indicando el 10 la máxima preferencia:

Tarjeta	Acceso	Actividad	Servicios	Valoración
1	A pie	Senderismo	Visita guiada	
2	A pie	Montaña	Mesas pic-nic	
3	Vehículo	Montaña	Visita guiada	
4	Vehículo	Senderismo	Mesas pic-nic	
5	Vehículo	Bicicleta	Mesas pic-nic	
6	A pie	Bicicleta	Visita guiada	
7	Vehículo	Equitación	Visita guiada	
8	A pie	Equitación	Mesas pic-nic	

DATOS DESCRIPTIVOS:

36. Edad (años):

☐ De 18 a 24 ☐ De 25 a 34 ☐ De 35 a 49
☐ De 50 a 64 ☐ Mayor de 64

37. Renta familiar mensual aproximada (€)

☐ < 900 ☐ 900 a <1500 ☐ 1500 a <2100 ☐ 2100 a <3000 ☐ ≥ 3000

38. Indique si su nivel de estudios:

☐ Elemental ☐ Medio ☐ Superior

39. Indique su actividad laboral:

☐ Ama de casa ☐ Asalariado ☐ Estudiante
☐ Empresario ☐ Jubilado ☐ Otras situaciones:

40. ¿Es usted miembro de alguna asociación para la conservación de la naturaleza: ☐ Sí ☐ No

41. Localidad (y provincia) de residencia habitual:

42. Sexo:

☐ Hombre ☐ Mujer

43. Situación meteorológica:

☐ Lluvia ☐ Nublado ☐ Nubes y claros ☐ Soleado (temperatura moderada) ☐ Soleado (altas T_{as})

44. Lugar de realización de la encuesta:

☐ Aparcamiento ☐ 1º mirador ☐ 2º mirador
☐ Subida a la cueva ☐ Charco de la truchas ☐ Otros: _____

45. Sugerencias: