

Determinants of Public Forest Management Decisions: The Calares Delmundo and Sima Naturlpark (SPAIN)

Bernabéu, R.* and Samos, A.

Higher Technical School of Agricultural Engineering, University of Castile-La Mancha, Campus Universitario s/n, 02071 Albacete, Spain

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ABSTRACT: Public authorities should assess what recreational services can be offered citizens visiting a protected natural area. Therefore, the characterisation of visitors as well as the economic valuation of a park's recreational use would allow the proposal of management strategies to satisfy visitors. For this purpose, 410 surveys were taken of visitors to the Calares del Mundo and Sima Natural Park (Spain). The results showed two segments of visitors. The first segment is better informed about topics related to the environment and has a higher educational level and higher monthly family income. However, they are willing to pay less to enter the park (3.70€). Meanwhile the visitors from the second segment are more conscientious about environmental problems and are familiar with other natural areas. They are willing to pay more for park entrance (4.61€), even though they have lower incomes, because they value the scenic beauty of the park and particularly, the singularity of the waterfall and the source of the Mundo River.

Key words: Natural Areas, Visitor Life Styles, Contingent Valuation, Maximum Willingness to Pay, Castile-La Mancha

INTRODUCTION

In principle, the function of the first protected natural areas, as was the case of Yellowstone National Park in the U.S.A. (1872), was limited to aesthetics and protection confronting threats from industrial and urban development. Nevertheless, these have evolved and nowadays it can be stated that protected natural areas have the functions of protection and conservation of the biophysical and cultural environment as well as educational, scientific, research, socioeconomic and recreational functions. The recreational function is based on the right of all citizens to enjoy a quality environment, with a series of services for leisure and enjoyment of nature. To satisfy this demand, the Autonomous Community of Castile-La Mancha has two National Parks (BOE, 1989): Las Tablas de Daimiel, and Cabañeros; six Natural Parks: 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. 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.

The Calares del Mundo and Sima Natural Park (Fig. 1) is the most recent one in Castile-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 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 area contains a *karst* of extraordinary development and wealth of forms, as well as great botanical and scenic diversity with an excellent degree of conservation of its ecosystems. This makes it exceptionally important from the viewpoint of the conservation of the geological heritage, biodiversity and scenery in Castile-La Mancha. The area is the second in Spain in density of dolines, calculated at 960 at least. Together with the sinkholes and *poljes*, they create a landscape of great contrasts to the pine groves, holm-oak woods, and the mixed forest proper

*Corresponding author E-mail: Rodolfo.Bernabeu@uclm.es

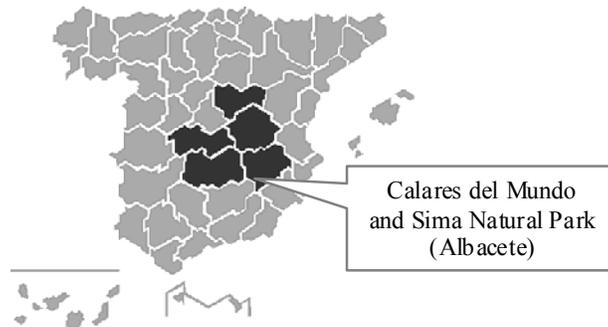


Fig. 1. Castile-La Mancha (Spain)

to the area. Currently, visitors to protected natural areas are characterised by a great heterogeneity, causing an increasingly diverse, exacting and fragmented demand for recreational activities. In this scenario, to try to satisfy all individuals with a single proposition will hardly lead to their satisfaction since their needs, resources, attitudes and behaviours can be quite diverse. Segmentation means the division of the totality of visitors into groups of relatively homogeneous persons based on some criteria or characteristic so that each group can be served with differentiated strategies that allow their desires and demands to be satisfied adequately (Bigné *et al.*, 2000). Its application presents undoubted advantages for natural area managers as well as for the visitors themselves. For the former, it permits detecting and analysing visitor demands, evaluating to what degree their needs are covered and simultaneously promoting strategies for protecting natural areas by knowing the potential behaviour of the visitors in greater detail. From the perspective of the visitors, grouping according to their common characteristics makes it possible to satisfy their desires more effectively by adapting the activities to those desires.

There are several criteria for carrying out that segmentation. Geographic segmentation is the one most used in the tourist market (Lage and Milone, 2000). Usage segmentation identifies the segments based on the levels of consumption of products or services in the above-mentioned market (Niefer, 2006). Consumer segmentation based on socioeconomic characteristics is one of the most traditional kinds (Mohtinho, 2000; Picón *et al.*, 2004). Nevertheless, Lambin (1995) indicates that socioeconomic criteria explain the growing personalisation of individual consumption less and less in developed economies because of sociocultural changes. Due to the explanatory inadequacy of traditional criteria, personality-based segmentation (Beh and Bruyere, 2007; Devesa *et al.*, 2008), depending on preferences for services (Samos

and Bernabéu, 2011a; Sánchez and Pérez, 2000) and consumer life styles (Cervantes *et al.*, 1999; González, 2005; Moutinho, 2000), is of great utility.

Of the various above-mentioned criteria for segmenting the market, the first hypothesis proposed in this paper was the possibility of segmenting visitors to the Calares del Mundo and Sima Natural Park according to their life styles with the purpose of satisfying their needs and desires in the most adequate way. As a key element of management, it was of interest to compute whether the visitor segments would be willing to pay to enter the park and in turn, what their maximum willingness to pay (WTP) would be since the absence of valuation of these resources could lead to over-exploitation and inadequate use. The main reason why goods without a market are valued is the same as that which assesses private property, that is, because probably a more effective use will be made of them if those goods have a price (Pearce and Turner, 1995). And so, the second hypothesis proposed in this paper is that visitors' WTP will be different for each visitor segment. Practitioners of the contingent valuation method (CVM) like Mitchell and Carson (1989) or the members of the so-called National Oceanic and Atmospheric Administration (NOAA) panel recommend to use always the WTP format for practical studies. The reason is that WTP turned out to be smaller than willing to accept (WTA) in most practical CVM surveys so that the WTP is the conservative choice (NOAA, 1993). Therefore, WTP should be chosen if we want to implement an environmental improvement and WTA should be employed if we want to sue a polluter for environmental damage (i.e. if we want to compensate society for the loss of environmental quality) (Ahlheim and Buchholz, 2000). Different methods were proposed to estimate WTP, among which the contingent valuation method is exceptional. To carry out that estimation, it was necessary to discover the value that people concede to a determined environmental resource, by asking

them, and thus to create a hypothetical market for a good without a market, exactly as is shown in various previous papers in Spain (Caparrós y Campos (2002); Del Saz y Suárez (1998); Farré (2003); Júdez *et al.* (2002); Oviedo *et al.* (2005); Pérez *et al.* (1996); Rebolledo y Pérez (1994); Riera *et al.* (1994); Samos and Bernabéu, 2011 b). Once the hypotheses were proposed, the objectives of this paper were twofold. In the first place the purpose was to make segmentation depending on the life styles of visitors to the CalaresdelMundo and Sima Natural Park. The second objective was to estimate the economic value of its recreational use starting from the determination of the WTP for an entrance ticket to the park. Then specific management strategies could be established.

MATERIALS & METHODS

During the month of August 2009, 410 visitors to the waterfall and the source of the Mundo River enclave, part of the CalaresdelMundo 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.

The final questionnaire 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.

Interviewees were presented with several statements about their lifestyles which they assessed on a five-point Likert scale where 1 was the maximum level of disagreement and 5, the maximum agreement (Annex 1). Then a factor analysis was made to identify the basic units of information and to reduce the number of variables to a more manageable set without any apparent loss of information.

To carry out the factor analysis, we began with a calculation and examination of the correlation matrix, since the first requisite to be fulfilled for the factor analysis to make sense is that the variables be highly

correlated. The next step involved the extraction of the factors that were not directly observable variables or ideas, those which needed to be inferred from the input variables (Manly, 2008). The principal components method was chosen for the factor analysis; it consists of yielding a first factor that will have the maximum interpretation of the variance. Next, with the first factor and its associated factorial loads, the principal components will locate a second factor that will maximize the variance explained in this second factor. This continues until there are as many factors as variables, or until the analysis concludes that the number of useful factors has been exhausted (Manly, 2008). The varimax method was used in the rotation, in which a set of factor loads are sought so that each factor has some loads close to zero and other loads close to minus one or plus one.

To determine the number of factors to be kept, the Kaiser criterion (Kaiser, 1958) was chosen which suggests retaining those principal components whose eigenvalues are greater than one. Once the factorial scores were obtained, segmentation of the visitors was carried out by means of a multivariate segmentation analysis of K-means clustering, using the *Quick Segmentation Analysis* algorithm from the SPSS 15.0 statistical program (SPSS, 2008). Then the information on the determination of visitor lifestyles was complemented by socioeconomic characteristics which permitted the characterisation of visitors in each segment.

Questions directed toward detecting maximum willingness to pay for entrance to the park were included in the group of queries relative to the visit to the park. Logistic regression was used to calculate WTP. Logistic regression is a multivariate technique which aims to study association relationships between a dichotomous variable and one or several independent quantitative or categorical variables. Using logistic regression, the method of contingent valuation consists of asking a group of people how much they would be willing to pay to obtain a certain good, or as Bishop and Heberlein (1979) did, seeing whether the consumer acquires a certain good or not at a given price. Interest in the method grew rapidly in the 1980's. Hanemann (1984) was the one who established the theoretical basis for its subsequent application.

According to Hanemann, there is a relationship between dichotomous response models and the theory of utility maximisation that permits calculating willingness to pay for a good as a measurement of individual well-being, starting from the consideration that the consumer knows its initial utility function for certain. To calculate maximum willingness to pay by visitors to the CalaresdelMundo and Sima Natural Park

to enjoy its recreational use, the visitor responds to a series of questions about willingness to pay. Following Gil *et al.* (2000) a mixed format was chosen with binary-type and open format questions. In the first place, a dichotomous question was posed to the individual. A certain quantity of money or starting point was proposed and individuals responded whether they were willing to pay the suggested quantity or not. The quantities proposed, to avoid anchoring bias, were 2, 4, 6, 8, and 10 €. Next, and according to the answer received in the dichotomous question, a second open question was proposed to the visitors in order to find out their maximum willingness to pay. According to Hanemann (1984), WTP is calculated through the estimation of the following logarithmic function:

where D_i is a dichotomous variable that takes the value of one if the visitor is willing to pay the proposed price and zero if not. A_i shows the willingness to pay prices declared by the visitor, starting from the prices offered to the interviewees of 2, 4, 6, 8, and 10 €. The parameters to be assessed are a and b . The term of error is u_i . Starting from the previous logarithmic function, mean willingness to pay is calculated as follows:

$$D_i = \frac{1}{1 + e^{-(a+bA)}} + u_i$$

$$E(MDP) = \int_0^{\infty} (1 - G_{MDP}(A)) dA = \int_0^{\infty} (1 + e^{-(a+bA)})^{-1} dA = -a/b$$

RESULTS & DISCUSSION

The factorial analysis permitted the identification of four factors (informed, health, conscientious and active) that explain 60.86% of the variance (Table 1). In the first place, the segmentation using K-means clustering on the scores for the four factors permitted the classification of park visitors into two segments according to their lifestyles. Segment one consisted of 61.46% of the visitors. They were informed, although not conscientious, about topics related to the environment; they were concerned about their health, but were not active. On the contrary, segment two was formed by 38.54% of the visitors, who were conscientious although not informed about environmental topics; they were not concerned for their health, but were active.

In the second place, park visitor socioeconomic characteristics were analysed from the segments obtained (Table 2).

In general, park visitors were practically the same for men and women without a clear preponderance of either one. They were middle aged (35-49 years old) and non-residents of the province of Albacete, where the park is located. Nevertheless, the distinctive socioeconomic characteristics of the segments, which depend on significant differences, show that while the first segment is composed of a greater number of persons with a higher education, a monthly family

Table 1. Factor analysis of rotated factor matrix for visitor lifestyles

Visitor lifestyle	Factor	Factor	Factor	Factor
	1 Informed	2 Health	3 Conscientious	4 Active
I know about the greenhouse effect.	0.906	0.027	0.045	0.124
I know about contamination.	0.875	0.004	0.006	0.075
I know about desertification.	0.854	-0.001	0.183	0.105
I know about acid rain.	0.829	0.102	0.069	0.143
I know about renewable energies.	0.814	-0.034	0.189	0.239
I eat a healthy diet.	0.021	0.784	-0.029	-0.063
I am concerned about my health.	-0.118	0.652	0.247	0.138
I do not smoke.	0.026	0.637	-0.212	0.012
I get frequent health check-ups.	-0.035	0.608	0.347	-0.074
I buy environmentally friendly products.	0.236	0.524	0.343	0.064
Today's civilisation is destroying nature.	0.086	0.063	0.718	0.270
I am concerned about social issues (unemployment, health care).	0.031	0.025	0.712	-0.137
I am interested in information about the environment.	0.295	0.218	0.693	0.188
I meet with friends often.	0.048	-0.168	0.280	0.739
I participate in sports regularly.	0.160	0.235	-0.184	0.613
I use my free time to travel.	0.188	0.072	0.176	0.601
I use the Internet to find information.	0.474	-0.205	-0.121	0.555
<i>Explained Variance (%)</i>	<i>24.234</i>	<i>13.444</i>	<i>12.235</i>	<i>10.948</i>
<i>Cumulative Variance (%)</i>	<i>24.234</i>	<i>37.678</i>	<i>49.913</i>	<i>60.861</i>
Sample adequacy Kaiser-Meyer-Olkin (KMO): 0.843. Significance level of Bartlett roundness test: 0.000.				

Table 2. Socio-economic characteristics of visitors segments in Calares del Mundo and Sima Natural Park

Variables		Segment 1 (n=252) (61.46%) ¹	Segment 2 (n=158) (38.54%) ¹
Gender	Male	55.0	58.6
	Female	45.0	41.4
Age (in years)	18-24	6.8	10.8
	25-34	22.3	22.9
	35-49	42.6	36.9
	50-64	23.5	18.5
	? 64	4.8	10.8
Education ***	Grade School	22.3	40.8
	High School	40.6	43.9
	College	37.1	15.3
Monthly family net income (€)***	< 900	0.8	5.1
	900 to < 1,500	12.0	17.8
	1,500 to < 2,100	33.5	40.8
	2,100 to < 3,000	40.6	31.2
	? 3,000	13.1	5.1
Place of residence	Province of Albacete	14.9	12.7
	Other provinces	85.1	87.3
I am a member of an association for the conservation of nature **	Yes	4.0	0.6
	No	96.0	99.4

¹ Size of the segment.
 ***, ** and * indicate the existence of significant differences for a maximum error level of 1% and 5%, respectively.

Table 3. Characterisation of segments of visitors to the Calares del Mundo and Sima Natural Park according to their type of visit (%)

Variables	Levels	Segment 1 (61.46 %) ¹	Segment 2 (38.54 %) ¹
Length of the visit ***	< 2 hours	31.5	38.9
	2-3 hours	60.6	55.4
	>3 hours	7.9	5.7
Activities to undertake	Observation of flora and fauna *	75.3	66.2
	Hiking ***	59.4	44.6
Park characteristics **	Scenic beauty	42.8	57.3
	Diversity	3.8	2.4
	Dolines and cave	8.2	2.4
	Source and waterfall	13.8	22.6
	None	16.4	5.6
Improvements in the park	Others	15.1	8.9
	Installation of wildlife observatories *	36.3	28.0
The park fulfils other functions besides recreation *	Interpretative panels **	65.3	55.4
		88.0	80.9
Knows another natural area that gives the same degree of satisfaction ***		62.8	79.0

¹ Size of the segment.
 ***, ** and * indicate the existence of significant differences for a maximum error level of 1%, 5% and 10%, respectively.

income between 2,100 € and 3,000 € and a higher proportion of members of some association for the defence of nature, the second segment is formed by a greater percentage of visitors with elementary and high school educations, with a monthly family income between 1,500 and 2,100 € and a lower presence in associations for the defence of nature.

The visitor segment characterisation regarding variables related to the type of visit is shown on Table 3. Common characteristics of both park visitor segments are that their visit lasts between two and three hours and that they are occupied in the observation of the flora and fauna during their walk. Concerning improvements in the park, a smaller proportion of visitors from both segments suggest the installation of wildlife observatories compared to the insertion of interpretive panels. In addition, they feel that the park fulfils other functions besides recreation, such as educational and scientific functions, and they are acquainted with other natural areas that give them at least the same degree of satisfaction. In particular, their visit to the park is due to the scenic beauty of the whole and in particular to the source of the MundoRiver and its waterfall.

Nonetheless, the differences in opinion between each of the two segments stems from the visitors of the first segment making longer visits, being willing to hike and to observe plants and animals and proposing the installation of wildlife observatories and interpretive panels to a greater extent than visitors from

the second segment. Meanwhile, visitors from the second segment are more acquainted with other natural areas that give them at least the same degree of satisfaction.

Taking into consideration this paper's segmentation of park visitors depending on their life styles, compared to the one made in a previous paper depending on visitor preferences and using the Conjoint Analysis method (Samos and Bernabéu, 2011), a remarkable degree of convergence was observed regarding the various socioeconomic characteristics and the visit to the park. This comparison ratifies the fact that using two different criteria of segmentation leads to results that do not exclude, but rather complement and enrich, one another. Sánchez and Pérez (2000) carried out a segmentation of visitors to the Gorbea Natural Park (Spain) depending on their preference structure by dividing the population into four segments. They determined significant differences regarding WTP and length of time spent in the park. Niefer (2006) carried out segmentation depending on the wellbeing obtained by visitors to the Superagüi National Park (Brazil). He concluded that the differences among them permitted the development of specific products and management actions for each of the five segments that he obtained. Finally, willingness to pay for park entrance by each segment was calculated. It was observed that in general the visitors from the second segment were willing to pay more for park entrance than visitors from the first segment (Table 4).

Table 4. Statistics from the logistic regression and maximum willingness to pay (WTP)

Statistics	Segment 1		Segment 2	
	Surcharge	Constant	Surcharge	Constant
β	-0.599	2.218	-0.629	2.898
E.T.	0.101	0.443	0.124	0.548
Wald	35.484	25.047	25.651	27.945
g.l.	1	1	1	1
Sig.	0.000	0.000	0.000	0.000
Exp. (β)	0.549	9.185	0.533	18.135
WTP (lower; higher) ¹ (€)	3.70 (2.79-5.52)		4.61 (2.54-5.75)	
¹ A 95% confidence interval of the WTP				
Segment 1: -2LL: 198.855, Cox and Snell R ² : 0.300, Nagelkerke R ² : 0.409. 76.7 % of the cases are correctly classified.				
Segment 2: -2LL: 110.645, Cox and Snell R ² : 0.346, Nagelkerke R ² : 0.467. 74.8 % of the cases are correctly classified.				

Annex 1. Descriptive statistical indicators for visitor lifestyle.		
Variables	A	SD
I am concerned about social issues (unemployment, health care).	4.51	0.75
Today's civilisation is destroying nature.	4.47	0.76
I meet with friends often.	4.02	1.04
I am concerned about my health.	3.98	1.04
I am interested in information about the environment.	3.84	1.01
I do not smoke.	3.73	1.63
I eat a healthy diet.	3.71	1.06
I use the Internet to find information.	3.60	1.52
I know about contamination.	3.59	1.10
I know about renewable energies.	3.46	1.24
I use my free time to travel.	3.16	1.15
I know about acid rain.	3.13	1.24
I buy environmentally friendly products.	3.11	1.17
I know about the greenhouse effect.	3.10	1.21
I get frequent health check-ups.	2.87	1.52
I participate in sports regularly.	2.82	1.43
I know about desertification.	2.54	1.30
A: Average; SD: Standard deviation		
Likert scale, from 1 (strongly disagree) to 5 (strongly agree).		

CONCLUSION

Depending on the life style of visitors to the Calares del Mundo and Sima Natural Park, two significant segments of visitors can be differentiated. In turn they are authenticated by the differences in their socioeconomic characteristics (education, monthly family income, etc.) and in the type of visit they make (duration, activities, improvements they propose, etc.). This information is very valuable and can be used by park managers for the specific offering of services by visitor groups. The first segment is formed by 61.46% of the visitors, persons who are informed, although not conscientious, about topics related to the environment, who are concerned for their health, but are not active. It is composed of a greater number of people with a higher education, a monthly family income between 2,100 € and 3,000 € and a greater proportion of members of some association for the defence of nature. They make longer visits, are willing to hike and observe flora and fauna. As improvements in the installation, they propose wildlife observatories and interpretive panels to a greater extent than visitors from the second segment. They are willing to pay a maximum of 3.70 € for entrance to the park.

The second segment is formed by 38.54% of the visitors. They are conscientious individuals but are not informed about the various environmental topics and in principal are not concerned for their health, but are active. They are acquainted with other natural areas to a greater extent than visitors from the first segment, even though they are the ones who value the scenic beauty of the park the most and particularly the source and waterfall of the Mundo River. They are willing to pay 4.61 € to enter the park even though their

incomes are smaller (between 1,500 € and 2,100 €). To conclude, once visitor characteristics, their demands for services and their willingness to pay for recreational use of the park have been identified, it is possible to make some recommendations to public managers to promote its use and enjoyment by visitors through the establishment of two groups of strategies:

Strategies for visitors with higher incomes, more education and more environmental information (the first segment), would be to mark hiking routes of different duration with the possibility of participating in mountain activities such as climbing to the tops or going along the sides, on foot or bicycle. Also, specific areas could be established for observing fauna and flora, as well as rest and refreshment areas. These visitors, although more demanding in services, are less willing to pay for entrance to the park, perhaps because they know of other, alternate natural areas that give them greater satisfaction for the price they pay. Strategies for those with lower incomes, less education and less environmental information (the second segment), would be to carry out generic information campaigns in the media, emphasizing environmental functions and the importance of the conservation of the park. There could be specific campaigns in a nature interpretation centre in the park itself through the projection of informative videos. Brief workshops and activities could be offered there about various aspects of the park such as the identification of fauna and flora, fruit and leaves of various species, the identification of protected species found in the park, and so on. Short walking routes could also be established since there is a greater presence of persons over 64 years old in this segment.

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