GALICIAN NATURAL HERITAGE: USE VALUE AND PRESERVATION VALUE

Manuel González, Xosé Manuel González, Philippe Polomé & Albino Prada

1. Introduction

This paper presents the results of an environmental evaluation carried out in respect of two natural parks in Galicia (in the north-western part of the Iberian peninsula). For the Illas Cíes natural park (henceforth referred to as the Cíes Islands) we estimate the preservation value for both users and non-users (the public in general), and for the Monte Aloia natural park (henceforth referred to as Monte Aloia), the benefit deriving from its use for recreation. For both cases different outputs without a market are evaluated and subsequently, public intervention in both is assessed. The results obtained would indicate an evident social benefit. If only visitors to the Cíes Islands are taken into account, then the cost/benefit ratio amounts to 4.9, which is to say, each unit of expenditure generates almost five units of social output. Moreover, this ratio increases to 8.2 if we take non-visitors into account in the evaluation process. For Monte Aloia also, our cost/benefit analysis indicates that the benefits from recreational use (1.9) exceed the cost to the public purse of financing the reserve.

Our results should be viewed against the background of a social demand in which a growing interest in the preservation of areas of nature is associated with the increasing scarcity of environmental assets. Public

authorities in particular are concerned with the design of strategies for the preservation of these areas of nature. Nevertheless, it seems reasonable to expect that the public expense involved be justified in terms of competing social demands, i.e public authorities should ensure that intervention is efficient in terms of requiring that any goal be met at least overall cost, that benefits exceed costs for any course of action, and that, wherever possible, goals should themselves be determined by reference to a maximum excess of benefits over costs. Benefit is defined as a gain in the well being, i.e. utility, of an individual or group, and cost as a loss in well being. All intervention alternatives that pass the cost/benefit test, i.e. offering benefits that exceed the corresponding costs, can be ranked in terms of individual preferences and then applied within the limits of the funds available.

The introduction of efficiency into public decision-making requires resolution of the problems inherent in the application of evaluation criteria to outputs without a market. We should remember that the 'products' supplied by a natural park are non-marketable goods, and so it is necessary to utilise methodologies that permit an assessment of the value that society places on these goods. One such methodology is the Contingent Valuation (CV) method, which has been widely applied for almost 40 years[1] . The method is officially recognised in the United States and in the European Union, and two guides to its application have been published (NOAA, 1993; Carson, 1999). The technique models a hypothetical market in which interviewees reveal their willingness to pay (WTP) in order to promote an improvement or avoid a deterioration in the public good (or their willingness to accept a deterioration or that an improvement is not made). The major advantage of this method is that the interviewees do not have to be users of the output for this to be valued.

The travel cost (TC) method - one of the oldest approaches to environmental evaluation - was proposed in a letter from Harold Hotelling to the US Forest Service in the 1930s. It first used by Wood and Trice in 1958 and was subsequently popularised by Clawson and Knetsch (1966). This method uses expenditure and observed behaviour so as to obtain an indirect measurement of the value of goods without a market. Thus the

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[1] One of the pioneering studies was that of Davis (1963), an application for Maine concerning recreational use. Published in 1993 (NRDA) was a bibliography of 1,141 applications of the CV method that had been described in top scientific journals.

number of visits to an area of nature is considered to be an approximation to Quantity, and the sum of travelling costs and opportunity cost is considered to be an aproximation to the Price variable. On the basis of this data, the demand function and consumer surplus can be estimated which correspond to the area under the demand curve, and which take account of the additional amount that the respondents would be willing to pay over and above their current costs.

The two applications carried out in Galicia and described here (Monte Aloia and Cíes Islands) were not inspired by institutional bodies (such as the government, a local authority, etc) as is common in other countries (see Section 2 of this monograph), but rather by an academic interest in applying these public good evaluation methods for the first time in Galicia (see Gonzalez-Gomez' doctoral thesis concerning the Monte Aloia). Thus the use value of a forested area of nature was quantified with a view to integrating recreational output in the returns calculated for the forestry exploitation that includes Monte Aloia. The Cíes Island application, which quantifies the social benefits of preservation in terms that also include non-users, was a pioneering study in both Galicia and Spain. Moreover, these studies did not merely involve a routine transfer of techniques and values calculated for other applications to the case of Galicia. On the contrary, the contribution of these local applications lies in the fact that they open new investigative paths, whilst providing information of particular value in terms of the administration and management of the Galician natural heritage.

The following sections are organised into a description of the study zones, then an estimation of the benefits and finally, an assessment of the current level of public intervention.

2. The natural parks

Monte Aloia has a surface area of 746 hectares, and contains no flora or fauna of particular significance[2]. It is fairly representative of mountain areas in Galicia and Northern Portugal, with plantations of eucalyptus and

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[2] Monte Aloia is located in the municipality of Tui (province of Pontevedra), on Galicia's borders with Portugal and some 30 kms south of Vigo, Galicia's largest urban centre. The Cíes Islands are located off the coast of Vigo.

maritime pine dominating (Gonzalez Gomez, 1999). Forests cover 80% of the surface area of the reserve (deciduous species represent only 0.5%) and the remaining 20% is treeless and not put to any productive use. Nonetheless, unlike other forested areas of coastal Galicia, in Monte Aloia rotation periods are longer, the density of trees is lower and the diversity of species is greater. Moreover, clear-cutting is not practised, and recreational facilities are provided.

MONTE ALOIA
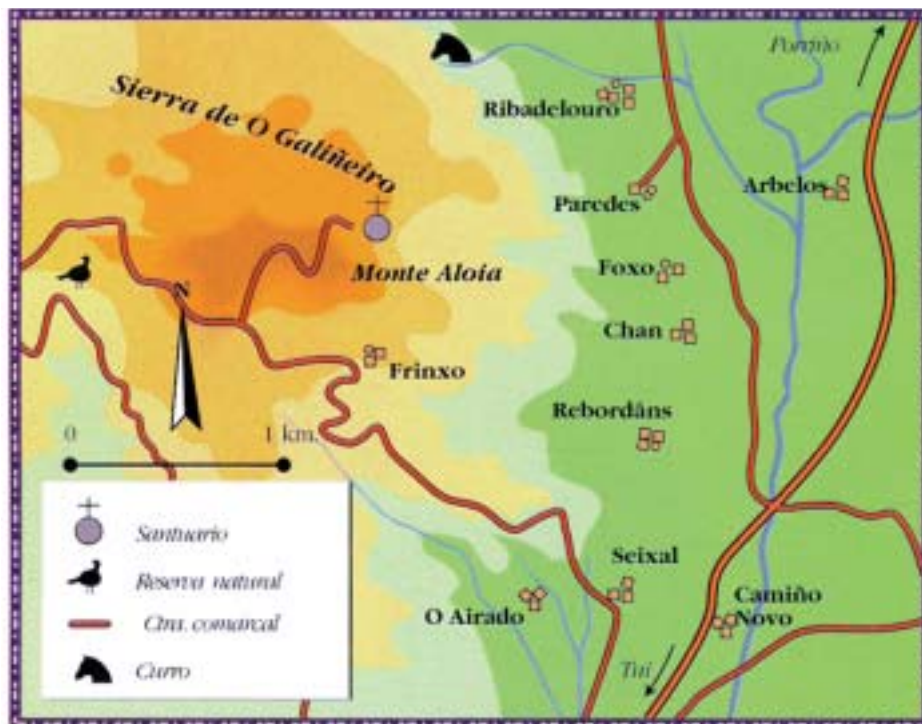
In accordance with the classification of the FAO (1986), the recreational use of Monte Aloia is significant given that it receives visits during more than 10 days of the year per hectare. The total number of visitors is 82 000/p.a., identified as coming from the following areas: Tui municipality 5%; the Baixo Miño area (Tomiño, Oia, O Rosal and A Guarda) 21%; Vigo 33%; the rest of the province, 10%; the rest of Galicia 7%. The remaining 24% represents visitors who come from other parts of the Iberian peninsula, particularly Portugal, Madrid and Barcelona. The visitors state that Monte Aloia's principal attractions are its tranquillity, the panoramic views, the absence of traffic and the possibilities it offers for walking and trekking.

CÍES ISLANDS

The Cíes Islands Natural Park on the other hand, tends to be emblematic of the northwestern Iberian peninsula. The reserve occupies a total surface area of 966.9 ha, of which 434 ha are land, and is composed of three islands, San Martiño, Faro and Monte Agudo. The islands are the refuge of eleven bird species classified as in danger of extinction in Appendix 1 of European Union Directive N.º 79/409. Among these species are the yellow footed seagull (Larus Argentatus Michahellesi) and the crested cormorant (Pholocrocarax Aristotelis). The Islands are classified by the Spanish authorities as a protected bird sanctuary (Zona de Especial Protección de Aves, i.e. ZEPA), in the IBA (Important Bird Area) document drawn up by the European Commission, the International Bird Protection Council and the International Water Bird Research Board (IWRB). In addition the Islands are inhabited by species listed in the Appendix of the European Directive No. 92/43, which extends the protection of bird species by obliging member States to preserve areas of special interest to the entire European community. For this reason the Cíes Islands are included in the Natura Network 2000 proposal to the European Commission.

Apart from their very significant ecological value, the Islands represent a popular tourist attraction. Visitor data are as follows: local visitors from the city of Vigo and the entire province of Pontevedra represent 11% and 17% of visitors, respectively; Galicia (including Vigo and Pontevedra) represents 46% of visitors and the remaining 56% come from other parts of the Iberian peninsula. The number of visitors per day is restricted to 2,000 and overnight stays to 800 persons per day (camping in the official campsite is the only accomodation permitted). Visits usually take place in the summer season, which runs from Easter to September when public transport in the form of a ferry is available, and the annual number of visits is 150,000 approximately.

3. Valuation of Benefits

The monetary value of the three benefits mentioned previously (recreational output for visitors to Monte Aloia, and preservation value for both users and non-users of the Cíes Islands), are calculated in terms of the equivalent consumer surplus method (Johansson, 1987). In the first place is the willingness-to-pay (WTP) value, or viewed from another perspective, the income forgone in order to visit Monte Aloia, which causes a reduction

in utility. Secondly, there is the WTP value that visitors to the Cíes Islands place on the maintenance of current levels of protection, and finally there is the WTP value that non-visitors place on the maintenance of current levels of protection with a view to avoiding a deterioration in the environmental quality of the Islands.

Utilising structured survey techniques, the CV method permits these values to be calculated by constructing hypothetical markets. The survey has as its first objective the estimation of the WTP value, but the information necessary for a calculation of the Marshallian demand functions is also collected, and thus an observation of visitor behaviour and an assessment of the expenditure associated with visits to natural parks are included as further objectives of the study. In the three cases in question, i.e visitors to Monte Aloia, visitors to the Cies Islands and non-visitors to the Cies Islands, personal interviews were carried out on the basis of a questionnaire structured so as to obtain four principal kinds of information, as follows:

1. Use[3] of the reserve, reasons for visiting the area, information concerning the possibility of a future visit by non-visitors.

2. Most attractive features[4] of the reserve.

3. Socio-economic data.

4. Willingness-to-pay data.

Before being confronted with the hypothetical scenarios and the WTP question, visitors to Monte Aloia were encouraged to contemplate their current personal income allocations and budgetary constraints, and to evaluate forestry management. They were thus asked their opinions concerning the current state of maintenance of the reserve, maintaining it at this level without contributing additional funds, permitting its deterioration by dedicating resources to other alternatives, and paying more to improve the quality and/or quantity of forested land. Once the visitors had declared the amount of money that they would be willing to pay in order not to forgo visits to the area in its current state, they were asked the second question, which was whether they would leave off visiting Monte Aloia if the entry fee were higher, and what their maximum WTP would be.

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[3] For example, frequency of visits, travel costs, and opportunity costs for visitors.
[4] Scenic views, tranquillity, species of flora and fauna, beaches etc.

The physical description of the Cies Islands and the hypothetical evaluation scenario (an absence of preservational measures for the Islands) utilised in the survey were produced in accordance with the work of Patiño et al. (1989) and Fernández (1986), and on the basis of information obtained from administrators and experts. In order to be able to describe the area (as fully as possible, particularly in respect of non-visitors) in terms of its most representative features, information concerning the reserve (location, areas of water, beaches, flora, fauna, absence of vehicles, residues and buildings etc) was provided accompanied by photographs.

Once the current situation was illustrated, the WTP question was put to the visitor in terms of the disjunctive of either accepting environmental deterioration in the absence of public intervention or alternatively, contributing to maintenance costs by means of the payment of an entry fee per day of visit. It should be pointed out that the payment of a fee has the advantage of having greater credibility in comparison with alternatives such as a special tax, a levy or contributions to a special fund. In addition, given the insular nature of the reserve and the restrictions to access except by public ferry (or private boat), exclusion is both possible and simplified. Moreover, the entry fee as a payment instrument is a familiar concept locally, given that it is applied at another nearby and highly popular panoramic area (Monte Santa Tegra: 400,000 visitors per annum). Finally, the employment of an entry fee means that visitors staying more than one day do not tend to answer more positively, due to the fact that the cost of their entry to the Islands would be apportioned to all the days of their stay..

The format utilised was that of the closed question (Bishop and Heberlein, 1979) with follow-up (Hanemann et al, 1991), i.e if a WTP value is proposed which receives a positive response, then the same question is repeated with a higher fee, whereas if the answer is negative, then a lower fee is proposed. The six pairs of values utilised were obtained from combinations of 300, 600, 900, 1, 200 and 3,000 with a minimum of 100 and a maximum of 5,000 pesetas. These values, obtained by means of a design in phases, were based on Hanemann and Kanninen (1999). The six pairs were randomly distributed between the sampled visitors. The result is double answers from each interviewee that generate for each opening fee four intervals in function of the sequence of answers. The interviews for the

Monte Aloia survey (402) were carried out between June 1994 and May 1995 and those for visitors to the Cíes Islands (523) were carried out in the summer months of 1998, and for non-visitors (319) in the autumn and winter of 1998/1999.

On the basis of the information obtained from the interviews, we can calculate the WTP by assuming that the second answer to the amounts proposed is identical to the first answer. This justifies the utilisation of a double-bounded dichotomous model whereby the two answers are assumed to have the same level of reliability. On the other hand, when the second answer is not so reliable as the first yet some correlation is considered to exist (Hanemann and Kanninen, 1999), then this can be used in the calculation process. In this case we have two possible distributions for the WTP value, one for each answer, and the calculation is carried out separately for each of the answers.

In the probit bivariant estimation, the significant regressors are found to be sufficiently different for the first question and the second. For the latter also, the coefficient of the variable that supports the reliability of the interviewee answer is significant, casting doubts on the virtuality of the second answer. The correlation coefficient for both answers is 55%. The fact that this is significantly distant from zero would indicate that correlation does not exist between the two variables. Moreover, the fact that the first answer is not influenced by the second, but rather the contrary, would seem to indicate that the initial answer given by the interviewee is more reliable.

On the basis of this information (summarised in chart 1), it can be concluded that the probability of a positive answer to the amount proposed increases for a higher total cost of the visit, and also when the visitor is male, when tranquillity is the feature declared to be most important, and finally, for a greater environmental consciousness of the individual. On the other hand, the probability of a positive answer diminishes for vistors whose main interest is sunbathing on the beaches and for those who declare themselves to be very satisfied with the visits. The calculated WTP value amounts to 2,252 ptas with an interval of confidence, in accordance with Krinsky and Robb (1986), that ranges from 1,988 to 2,622 ptas.

Chart 1
Results for Cíes Island Visitors using a probit bivariant model

Regressor	Coefficient	P-value
Constant	- 1,997	0,050
A	- 0,053	0,000
Dsat	- 0,329	0,084
Dplaya	- 0,318	0,010
Dtranqui	0,234	0,067
Iverde	0,106	0,044
Sexo 0,317	0,014	
Ln (c)	0,356	0,004

The question of whether to utilise the first or both questions for non-visitors was analysed in the same way as for visitors. For the non-visitors – and unlike the case for visitors - the first and second question are almost perfectly correlated (a calculated correlation coefficent of 91%, significantly different from one of 5% but not from one of 10%). Another difference from the estimation based on the probit bivariant model is that the significant explicatory variables of the WTP are practically identical and coincide with the coefficients calculated for both answers. These results validate the double-bounded dichotomous model as the most efficient.

As can be observed in chart 2, the probability (in this case of a negative reply) naturally increases with the amount proposed (A), and above all, in proportion to the age of the interviewee. Nevertheless, it diminishes for visitors who have been to other natural parks and for those who have a greater environmental conscience (for example, these consider that the principal attraction of the Cies lies in the absence of pollution). The symmetry that can be observed in these results, in contrast with the results for users, reinforces – a posteriori – the appropriacy of the proposed scenario (preservation and non-active use) and the verosimilitude of the WTP data. The expected WTP value for non-visitors in the province rises to 928 ptas/p.a. per household with a confidence interval of 744 ptas. [531; 1275].

Chart 2
Results for Cíes Island non-visitors using a double-bounded dichotomous model

Regressor	Coefficient	P-value
Constant	- 0,184	0,050
A	0,004	0,000
Isabe	- 0,009	0,017
Edad	1,501	0,0001
Iverde	- 0,115	0,032
Dlimpio	- 0,416	0,006
Cinco	- 0,402	0,0095

The mean of the WTP value in the case of Monte Aloia amounts to 382 ptas. With a view to analysing the validity of this WTP value, we assess whether it is a chance occurrence or whether, as one would expect, it could be explained by socio-economic variables. This econometric analysis was carried out using the Ordinary Least Squares (OLS; data summarised in chart 3) method. The factors that cause the WTP value to increase are when visits tends to be longer than average, when overnight stays away from home are involved and when the WTP value is modified (when respondents are reminded that they would not be able to visit if they did not pay). In sum then, we can reject the null hypothesis of the non-influence of the explicatory variables on the WTP value, and R^2 exceeds Mitchell and Carson's (1989) suggested figure of 0.15.

Chart 3
WTP for Monte Aloia using OLS

	Coefficient	P-value
C	42,7	0,302
DEFUERA	130,6	0,072
VISITA	21,5	0,014
CORRECT	342,9	0,000

By applying the TC method to the Cies Islands we can estimate the consumer surplus. This corresponds to the integral of the demand curve expected on the basis of costs incurred to the level where expected demand is cancelled (shock price). In discrete Poisson models the shock price is infinite, given that there is no point at which expected demand is zero (i.e. there always exists the possibility, however small, of a positive demand). The expected value of this surplus is:

$$\int_{p}^{+\infty} \exp(\alpha + \beta t)dt = -\exp(\alpha + \beta c)/\beta,$$

where a is a constant that represents the product of the significant regressors in terms of their coefficients, with the exception of cost which is represented separately by c; b is the corresponding coefficient, and exp the exponential function. The surplus is calculated taking the mean values of the sample of expected demand (i.e. the regressors different from the cost take on the mean value of the sample). The annual value of the consumer surplus per visitor – given that the demand function is calculated for five years – amounts to 8,270 ptas with confidence interval limits of 95%, ranging from 5,900 to 13,356 ptas.[5]

In the case of Monte Aloia, a truncated Poisson model was used to calculate the CV. Significant in the explanation of the number of annual journeys are the following: displacement costs, the fact that the visitors are non-active, make the visit from their usual place of residence, have university level education and/or are from Vigo. The consumer surplus calculated in this way amounts to 4,924 ptas per visitor p.a. or some 780/ptas per visit (given that the average number of visits is 6.3 p.a).

4. Assessment

The consumer surplus obtained for both natural parks give us a measurement of the social benefit generated by access to these natural parks

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[5] We also estimated the demand curve using the zoning method, which rates the visitor as a zone rather than an observation. The zones were established by describing concentric circles around a midpoint that was the park itself. In our case the zones were determined by the provinces. With a definition of costs other than individual ones – given that the costs declared to be incurred by the individuals cannot be used – the consumer surplus was estimated as 5,936 pts/visitor/p.a.

in the conditions in which the visits were made. It must be pointed out that it is not a question of the value of the reserves per se but rather of the value of the right of access to these. In the case of the Cíes Islands it is totally appropriate to utilise the benefits obtained for both visitors and non-visitors via the CV method, given that both groups associate these benefits with the effects of public intervention.

Bearing this in mind, the 41,000 ptas/ha in recreational benefits obtained for Monte Aloia exceed by a wide margin the costs incurred by the public authorities (22,000 ptas/ha). In the case of the Cíes Islands also, the benefits for users (733,500 ptas/ha) exceed even the relatively high costs[6] of maintenance and management (124.000 pts/ha). When non-visitors are included, the benefits corresponding benefits are even greater (some 1.2 million ptas/ha).

Chart 4
Comparative Ratios

	Usuario/custo	P-valor
Monte Aloia (1995)	1,9	_
Illas Cíes (1999)	4,9	8,2
Peneda-Gerês (Santos, 1999)	2,9	_
Posets-Maladeta (Pérez et al. 1998)	2,5	_
Ordesa Monte Perdido (Pérez et al. 1996)	3,6	_
Colorado (Walch y Loomis 1984)	3,1	6,9
South Downs (Willis 1994)	5,8	28,1
Albalasserwaard (Brouwer y Slangen 1998)	1,2	3,6
Breadalbane (Hanley 1996)	5,2	27,3
Pevensey Levels (Willis 1996)	-	18,2
N. Carolina y USA HCA (Loomis 1996)	0,7-8,2	3,5-42,1

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[6] Perez et al (1998:38) calculates average direct costs of 14.168 ptas/ha for a sample of Spanish natural parks.

The WTP results for visitors to these two natural parks (ranging from two to six times the costs incurred) are consistent with the range of values obtained in various international studies of a similar nature (Loomis, 1996; summarised in chart 4). In terms of the Iberian peninsula, the values obtained can be compared to the benefit/cost ratio of 2.9 obtained for Geres Natural Park (Santos, 1999), 2.5 for Posets-Maladeta Natural Park (Perez, 1998) and 3.6 for Ordesa-Monte Pérdido Natural Park (Perez, 1996).

When non-visitors are included and option, existence, altruistic and heritage values are incorporated, the ratio for the Cíes Islands increases to 8.2. Unfortunately it is not possible to make comparisons with other Spanish studies – given the non-availability of non-visitor benefit data – but these values are consistent with those obtained in other developed countries since the beginning of the 1980s.

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