NON-MARKET BENEFITS VALUATION OF CONSERVATION POLICIES IN SPAIN

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ABSTRACT

Natural resources play a strategic role in conservation policies around the world. The Commission of the European Union's (EU) Vth Action Program conservation policy has as one of it's main goals the Habitats Directive which will be implemented with the design of a network of protected areas. These protected areas will ensure a level of biodiversity and nature conservation and search for compatibility between economics development and nature conservation. The implementation of Natura 2.000 network will require member states to estimate total costs of conservation in order to obtain co-financiation from the EU. Benefits from protected areas have been classified in use and non-use. This paper reviews the potential benefits of the implementation of Natura 2.000 network in Spain. After briefly describing the main characteristics of nature conservation, we present a review of the studies carried out and the methods used to estimate recreational use and non-use values of natural areas in Spain, pointing out possibly weakness of the results obtained. Fourteen studies related to natural areas have been done up to date, revealing that recreational use and conservation of natural areas can generate a considerable social welfare for visitors and non-visitors.

RÉSUMÉ

Les ressources naturelles jouent un rôle stratégique dans les politiques de conservation dans le monde. L'action du V ème programme de la politique de conservation de la commission de l'UE a eu comme l'un de ses pricipaux objectifs la «directive d'Habitat» qui a été mise en pratique avec le plan du réseau des zones protégées. Ces zones protégées vont assurer un niveau de biodiversité, la conservation de la nature et la recherche d'une compatibilité entre le développement économique et la conservation de la nature. La mise en marche du réseau de la «Natura 2000» va avoir besoin des membres de l'Etat pour l'estimation des coûts totaux de la conservation dans le but d'obtenir un cofinancement de la part de l'UE. Le bénéfice reçu des zones protégées a été classifié en «usage» et «non usage». Cet article examine le potentiel des bénéfices de la mise en marche de réseau de la «Natura 2000» en Espagne. Après une brève description des principales caractéristiques de la conservation de la nature, on va présenter les études qui ont été réalisées sur ce thème, ainsi que les méthodes utilisées pour l'estimation des valeurs de «l'usage» et «non usage» des zones naturelles en Espagne, mettant en évidence la faiblesse des résultats obtenus. Jusqu'aujourd'hui quatorze études ont été réalisées en ce qui concerne les zones naturelles. Ces études mettent en évidence que «l'usage» pour la recréation et la conservation des zones naturelles peut générer un bien être social considérable pour les visiteurs et les non visiteurs.

Since Yellowstone National Park became the first protected area back in 1.872, over 20.000 protected areas have been established all over the world, accounting for nearly 5% of the earth's total surface.

Because of the decline in agriculture activity in developed countries and the increase of pressure on natural resource in developing countries, nature protection has gained a prominent place in the environmental policy agenda. Protection, that is landscape, ecosystems, flora and fauna species conservation, is not only an environmental objective.

The decision to protect an area also implies different economic effects, both as benefits and costs, which play an important role when we want to design a protection strategy for a country.

Environmental goods carry out different functions that can be classified into four groups (Pearce and Turner, 1990, Johansson 1987): *i)* they can provide raw material and energy as inputs for industry, *ii)* they receive the return of these processes as waste products, *iii)* they can be used for recreational proposes directly by consumers and, *iv)* they sustain life on earth. In the particular case of protected areas, timber production would be a function of the first type, CO_2 fixation by trees would be a function of the second type, visitors would be benefiting from a function of the third type and, last, species conservation and environmental quality preservation within a natural area would be a function of the fourth type. Type *i)* and *iii)* functions have private or quasi-private goods characteristics and their provision could be left to markets were quantities of these goods or services could be exchanged efficiently and prices for them would be generated. On the other hand, type *ii)*, *iv)* and, in some cases also type *iii)* functions, are pure examples of externalities, effects that are total or partially not captured by markets. Due to this lack of market prices, other exclusion mechanisms are required to avoid nature degradation, specially if their functions are highly valued by society. Collective action, by means of the public sector or NGO's, can provide rational and organised provision of these environmental services. Tools for this provision can be chosen from a wide variety option such as norms, taxes, subventions o direct management of natural areas.

Public action for declaration and management of protected areas is justified not only by ecological reasons but also for the social benefits they generated (Dixon and Sherman, 1990). Nevertheless, the impact of the de-

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claration of a protected areas on the economic activity of the surrounding areas must not be left unstudied. First, existence of a protected area implies a series of limitations regarding economic activities that can be carried out. For example, agriculture, forestry and grazing possibilities will be seriously curtailed. On the other hand, a natural area promotes direct or indirectly the development of other economic activities with a positive and important effect on income and employment, mainly dealing with conservation and tourism([1]).

In order to rationalise the debate about nature protection it's useful to have an estimate of the value that each of the functions carried out by protected areas have for society. If we have information on costs and benefits associated to each alternative policy, we can help to match policies and social preferences. The possibilities of obtaining information vary if we are considering functions which can be considered private goods or if these functions are public goods. In the first case, we can value these function using market prices or shadow prices if there is no direct market for a particular function. For functions that can be considered public goods which lack markets we need to use the methods developed by environmental economics. This paper is structured in four sections: first we review the nature protection strategy in the European Union, second we summarise the different methods developed to valuate environmental benefits for functions which have no markets, third we present a review of the literature on environmental valuation in Spain and last we present some conclusions that can be derived from this experience both for the value of environmental function of protected areas and for the possibilities of funding nature protection.

NATURE PROTECTION STRATEGY IN THE EUROPEAN UNION

The need for a supranational environmental regulation when an economic integration is taking place is based in three main reasons (Barberán, 1997): *i)* problems derived form pollution in one member state are not restricted only to itself([2]), *ii)* differences among states in environmental requirements for economic activity can distort concurrence in the single market and *iii)* the disappearance of trade barriers can lead to waste trade and lack of control on environmental guarantee for goods transport. Environmental policy in the European Union([3]) was not included as such in the Rome Treaty but this did not exclude the design of three action programmes before environmental issues were included in the Single European Act in 1986 (articles 130 and ss.)([4]). The Paris Summit of 1972 adopted a supranational environmental policy for Europe under the slogan "pollution has no borders" (San Juan, 1997) but due to the economic recession of the early 70's the first action program was not approved until 1974 for a four year period. Since then four action programmes have been approved (1978-1981, 1982-1986, 1987-1991 and 1994-2000).

The evolution of environmental policy has led to four main principles were already present in the first action program and are now part of the core legislation in the EU, this four main principles are: subsidiarity, preventive action (reinforced in the third action program), "polluter pays" and integration of environmental policies in all other sectorial policies (reinforced in the fourth action program). Subsidiarity, now a mayor principle in EU legislation, first appeared in environmental policy and regarding these issues requires that application and financiation of environmental policies are responsibility of member states. Preventive action should always be considered as the best option but other options such as corrective action are also considered when this principle is not possible. The polluter-pays principle has been widened to avoid the concept of "liable polluter" as it has been assumed that it is not the only agent of environmental degradation. The Vth action program supports the internalisation of environmental external costs but this internalisation should be based on co-operation among the different economic agents, leaving polluter's responsibility as a tools that should only be used as the last resource to punish environmental degradation. The fourth principle calls for the integration of environmental objective in all EU's sectorial policies, as experience has shown that environmental policies can do little to improve the environmental quality of the EU if sectorial policies promote environmental degrading practices. For example the common agricultural policy invests fourfold founds in promoting production, which can cause environmental degradation, than in promoting environmental measures (San Juan, 1995). In 1993 the European Environmental Agency (EEA) was created to generate environmental information to aid policy design and to provide the technical and scientific support needed for this. Since 1993 the environmental policy in the EU is ruled by the Vth action program designed under the title "Towards Sustainable Development". This program is aimed at solving the environmental degradation problems which still occur after the first four action programs. It's ultimate goal is to promote sustainable development in the EU, with an specific objective of a better environment by the end of the century. The general lines of intervention are: sustainable management of natural resources (land, water, protected areas and coastal

([1]) Examples of case studies where the economic impact of a protected area on the economic activity of the surrounding a is estimated can be found in Munashinge and McNeely (1994).
([2]) E.g. transnational rivers, greenhouse effect, acid rain, etc.
([3]) A comprehensive look at environmental policy in the European Union can be found in Fernández Álvarez (1997), and San Juan (1997).
([4]) Articles 2, 100 and 235 of the Rome treaty considered the possibility of adopting European policies related to environmental issues.

zones), integrated fight against contamination, waste management, reduction of non-renewable energy consumption, urban environment improvement and more efficient transport management and improvement in public health and security (industrial risk evaluation and management, nuclear security and protection against radiation). Five sectors have been selected to centre policy intervention both for their high environmental impact and for the possibilities of intervention at a supranational level: industry, energy, transport, agriculture and tourism.

Table 1 ***Valuation methods for environmental goods and services.***

	Direct observation	Indirect observation
Real markets	Market prices	Hedonic Prices Travel Cost
Hypothetical markets **No Market**	Contingent Valuation Delphi Dose-Response	Hypothetical Travel Cost

Within the European environmental policy we must highlight the initiative named Natura 2.000. In order to apply European Council directive 92/43/CEE related to natural habitats, wild fauna and flora protection (better known as "Habitat directive") Natura 2.000 has been designed as a protected area network which comprises the habitats and species listed in the directive(5). This network must be established before 2004 and at this moment member states are selecting the places that will be included under this network. In Spain in particular the objective is to protect 15% of the national territory which will mean that protected surface will be more than doubled(6).

In order to finance this network, both with cohesion and LIFE funds, the European commission has requested member states to estimate costs and benefits of nature protection under the different legal figures used in each country. It is here where the methods we present next can play an important role to justify public expenditure in protected areas programs.

NATURAL AREAS BENEFIT VALUATION(7)

Since the 1960's environmental economics has developed different methods to value in monetary terms environmental costs or benefits when there is a lack of market prices. We can classify these methods according to two criteria: the use of real or hypothetical markets and the direct or indirect observation of the market. This classification can be found in **table 1**.

Market prices are the most used sign to value in monetary terms goods and services. If there is a market where the good we want to value is exchanged, the point were demand and supply coincide generates the price which can be included as the market value of this good. As we mentioned earlier only a part of the functions carried out by protected areas can effectively be exchanged in real markets and part of their total economic value must be estimated using other methods(8). If the good we want to value is not directly exchanged in any market we can observe behaviour in markets that are related to environmental quality and it is sometimes possible to measure people's willingness to pay for the environmental good by using data from these markets. The two methods based in indirect observation of markets are the travel cost method and the hedonic price method, the travel cost method will be considered at length later on. The hedonic price method analyses the effects different characteristics have on the price of a good and then extends the analysis to the underlying demands for the characteristics. The most popular application of hedonic prices has been to value environmental quality through real state prices, although it has also been used to value risk through labour markets and product characteristics in marketing.

If there is no market for the good we want to value and we cannot find any other related market were this good is indirectly valued we can choose to create hypothetical markets for the good. In this case we have the contingent valuation method (CVM) and the hypothetical travel cost method (HTCM), both methods are based on surveys were a particular good or service is offered by the interviewer to people in order to obtain their willingness to pay (CVM) or the number of trips they would take to a protected area (HTCM)(9).

The travel cost method

The travel cost method focuses on the transport market to obtain the value of the recreational use of the protected area that causes the trip. The theoretical basis underlying this method is quite straightforward, although recreational use of protected areas does not imply paying a price for the use of the area(10), a visit to a protected area is far from having no costs. In order to visit a natural area a person must undertake some expenses such as the trip costs to reach the entrance to the area and/or the costs of the equipment necessary to carry

(5) Over 200 habitats and 500 species are included in the directive annex.
(6) In 1997 (last date for which there is available data) Spain had 596 protected areas under 21 different legal figures with a total surface of 3.2 million hectares, over 6% of total national territory.
(7) A thorough and comprehensive review of these methods can be found in Braden and Kolstad (1992) and Freeman (1993).
(8) Total economic value has been defined by Pearce and Turner (1990) for environmental goods as use value and non-use value. Use values can be partly exchanged in markets (timber production, recreational use, etc..) while non-use (option and existence value) is seldom exchanged in markets.
(9) Methods not based in markets are not contemplated in this paper, if interested please refer to Desaigues and Point (1993).
(10) In Spain and in Europe it's not widespread the establishment of a price or fare for the entrance to a protected area, nevertheless other countries (e.g. the US) require paying an entrance fee to access National Parks.

out the recreational activity. This expenses can be elicited through a survey carried out *in situ* or *ex-post* through mail([11]). With the data about costs associated with visiting a protected area and the number of visits during the last twelve months to this area we can estimate the demand curve for visits. Integrating this demand curve we can obtain the consumer surplus associated to a visit to the protected area, this surplus can be used as an estimate of the recreational use value of this area.

The application of the TCM is faced with several problems that make estimates unreliable, nowadays the application of more sophisticated econometric techniques have solved some of these problems while other, not related to the estimation methods but to the theoretical underpinnings of the method, are yet unsolved. Among the first type of problems we can mention the treatment of multipurpose trips and the functional functions used to estimate the demand curve, as second type we can point out the treatment of travel and stay time of visitors and the impossibility of estimating non-use values with this method (Hanley and Spash, 1993).

The treatment of time in TCM studies has proved to be very polemical, both trip time and time spent at the protected area can be included as costs related to the trip to a protected area and are normally the greatest part of the total cost. This makes estimates very sensitive to the options taken regarding this concept. As Freeman (1993) states "the election of the shadow price of time is a decisive step when we want to calculate the elasticity of the demand of a protected area and to estimate it's value" (page 449). Time invested in recreational uses has a cost indeed, the opportunity cost of investing this time in other activities. Thus, we must include time as a cost in order to model trip decisions correctly. Another issues is how to value time, as there are no markets for time([12]). McConnel (1985) solved this problem for the case when all visitors face the same opportunity cost for time as this effect would be captured by the constant term and exclusion of the time cost would no effect the estimates. Unfortunately, as people do not face the same opportunity cost for time we cannot elude this problem. The most common solution to this problem has been to input different percentages of market hour wage as shadow price for leisure time and to conduct a sensitivity analysis of estimates to this option. Randall (1994) has criticised this option as he mentions that fixing a shadow price for time, when it is a matter of individual decision unknown to the researcher, makes TCM estimates an ordinal measure of benefits derived from recreational use of protected areas. In this case, cardinal comparisons, as those used in cost-benefit analysis, would not be valid. In order to correctly use TCM estimates in cost-benefit analysis we need to take into account the different visitor's characteristics that can have an effect on the shadow price of time.

Another problem TCM researchers must face is multipurpose trips treatment. In this case it is not correct to use the total cost of the trip to value the recreational use of one protected area as those cost are done to visit two or more places. Options commonly used in TCM literature have been either to exclude these visitors or to ask people to rank in order of importance the different places they are visiting and input only a percentage of the total cost. Recently, Parsons and Wilson (1997) have proved that if joint consumption is not taken into account only little bias (ranging form 4 to 8%) in recreational surplus estimates.

Estimation of demand curves faces also econometric problems. The functional form used for adjusting the demand curve has been a source of debate. The dependant variable, number of trips to a protected area is truncated at one, as we only recall information of people that have visited at least once the area we want to study([13]), this makes estimated demand curves more inelastic than real ones. The fact that number of trips is a discrete variable, referred in literature as *count data* (Greene, 1993), makes continuos estimation techniques inappropriate. Both characteristics make demand curve estimates through ordinary least squares or generalised least square inappropriate, as consumer surplus' estimates will be upwardly biased (Willis and Garrod, 1991). These biases can be overcome using discrete choice models corrected for truncation to estimate the demand function, in particular Poisson and Negative Binomial distribution have been commonly used.

Last, we must mention that TCM can only estimate part of the total value of a recreational site. As the method is based in weak complementarity (Mäler, 1974) we are only estimating the use component of total value, as if a person does not visit an area he derives no utility from it. We are missing the non-use component of protected areas value which, as we will see from the empirical evidence, can be the greatest component of total value. Thus, TCM estimates must be always considered as a lower bound of the total value of a protected area.

Contingent valuation method

When we have no markets where the good we want to value is exchanged, nor can we observe in related markets how this good is valued, the contingent valuation method (CVM) allows us to create a hypothetical market to simulate transactions that would occur in a real market. In order to do so, a series of interview are carried out where the interviewer takes the role of supply

([11]) The study by Champ and Bishop (1996) demonstrates that people are also capable of reporting accurately their expenses in mail *ex-post* surveys.
([12]) Labour markets provide a shadow price for time (hourly-wage) but labour markets seldomly allow people to freely exchange extra-hours for wages as they are based on monthly wages.
([13]) Normally TCM studies are based on *in situ* surveys.

and the person interviewed that of demand. The aim of this simulation is to obtain the maximum willingness to pay persons interviewed have for a particular good([14]). In order to design a CVM study several basic aspects must be taken into account. First we must choose the level of information about the good we want to value that will be included in the questionnaire. An excess of information can lead people interviewed to give a higher value for the good than their real valuation, while a lack of information can lead people to value a good different from the one we want to value([15]). We also need to determine the payment vehicle and the question format we are going to use. For protected area recreational use valuation, payment fees have been widely used as people are familiar with real leisure markets where entrance fees are paid (cinema, amusement parks, private natural areas, etc..) and they provoke a low protest rate. When entrance fees are not plausible, as for example in areas with a geographical difficulty for access control, voluntary payments or raises in taxes have been used, but these payment vehicles cause a raise in the presence of strategic behaviour and higher protest rates respectively. Regarding question formats, there are two basic types of formats: dichotomous and open-ended. In dichotomous choice formats the person interviewed is faced with a determined price to which he has to answer if he is willing or not to pay it. In openedended formats we demand the exact quantity the person is willing to pay. The first format makes the valuation process easier but the information captured by it is less than in open-ended formats. From the combination of two or more questions and both question formats we can generate different multiple question formats such as the double or triple dichotomous choice format or the dichotomous choice with open-ended follow-up. For public goods, question formats that does not require information about willingness to pay (WTP) has been developed such as referendum formats where people are asked if they would vote for or against a particular environmental policy or the contingent ranking where people are asked to order different scenarios according to their preferences. Last, we must decide how the survey will be administrated. Surveys can be administrated in person, by mail or by telephone. The three options have advantages and disadvantages, while in person interviews allow person interviewed to obtain and understand more information their cost makes them unaffordable in many cases. Telephone and mail surveys are cheaper but are less flexible. For recreational services valuation of protected areas, as the are normally done *in situ*, in person surveys have been mostly used while for non-use values telephone and mail surveys are more common. From the data collected form the questionnaire we can obtain information about the mean and median (WTP) and estimate valuation function where we detect which characteristics affect WTP for the good we are trying to value. If we use open-ended question formats we obtain mean and median observed WTP. Valuation functions are estimated using linear and semi-logaritmic functional forms and with ordinary least squares, Tobit models have been also used when we include zero answers to valuation questions. If we use dichotomous choice question formats we must take several methodological decisions such as bid vector used for initial prices use in the valuation questions (Alberini, 1995; McFadden, 1994), the probabilistic model which characterises the error term (Maddala, 1983), the functional for and the independent variables which are included in the model to generate punctual estimates of WTP (Hanemann, 1984). Choosing among different options can have an effect on the estimates obtained thus reducing their robustness and making them less reliable as an aid to increase the efficiency of public expenditure in protected areas. To modelize value functions probit or logit models are use for single dichotomous choice questions and bivariate probit models for double bounded dichotomous choice questions. Contingent valuation has been criticised due to the possible presence of bias in the estimates obtained([16]). Biasses can be classified into two groups (Azqueta, 1994): non-instrumental and instrumental. The first group would have as hypothesis the impossibility of the CVM to obtain valid estimates of natural resource values. Strategic and hypothetical bias are the two non-instrumental biases. Strategic bias would be caused by the public good characteristics that natural resources have which would provide incentives for persons interviewed to answer zero or very high WTP values as part of free-rider behaviour. On the other hand, hypothetical bias would be caused by the use of hypothetical markets where nothing assures that responses would *a priori* predict behaviour in real market settings. Instrumental biases are caused by a lack of accuracy when applying the CVM. The presence of these biases would result in non-reliable estimates of WTP, and a lack of validity for them to be used in cost-benefit analysis. The expert-panel which NOAA used to evaluate the possibilities of CVM after the *Exxon Valdez* oil spill (Arrow et al., 1993) reached the conclusion that CVM does not face non-instrumental biases so long as several recommendations were followed.

([14]) For a detailed description of the CVM please refer to Mitchell and Carson (1989) and Carson (1992).
([15]) Unfortunately there is no *optimal* level of information to use in CVM studies, but Harrison and Lesly (1996) have demonstrated that an excess of information might raise the costs of the study without providing better estimates of willingness to pay.
([16]) For a review of CVM critics please refer to Hausmann (1993).

Case studies in Spain

In this section we review the TCM and CVM studies applied to protected areas environmental benefit valua-

tion carried out in Spain up to date. First we need to describe the type of protected areas that have been valued. **Table 2** summarises the main characteristics of the protected areas whose environmental benefits have been estimated. Out of the 11 sites valued 9 are protected areas, of these three are National Parks, five Natural Parks and one Park. National Parks are managed by the central government and include the most outstanding natural areas in Spain, Natural Parks and Parks are managed by regional governments. There exists an inverse relationship between activity restrictions and the type of legal figure used with more severe restrictions for National Parks than for Natural Parks and Parks. The two sites valued that have no legal figure of protection are a mountain area in Cataluña (Pallars-Sobirá) and an agricultural landscape in Andalusia (Sugar-Cane in Vega Motril).

Travel cost method applications in Spain

Table 3 summarises the main characteristics of all TCM applications published up to date (March 1998) in Spain. Seven studies have been carried out based on data from in person interviews to protected areas visitors with estimates ranging from 898 pesetas per visit to 11.570 pesetas per visit([17]). This variance in estimates is mainly due to the definition of travel cost and to the inclusion or not of time spent at the protected area as a cost. Most studies, all except for Loureiro and Albiac (1994) and Campos et al. (1996) include sensitivity analysis to these aspects and show a decrease in consumer surplus as cost definition is reduced in scope([18]). Some authors have chosen to use a cost per kilometre that includes both variable travel costs and an estimate for travel time while others have splitted total cost into travel and time costs. As mentioned before, there exists no agreement on which is the right definition of travel cost and there is no hierarchical order of validity for them, nevertheless, when comparing TCM estimates with CVM Riera et al. (1994) recommend using the most conservative travel cost definition. Estimation techniques have evolved since the early application taking into account the data characteristics mentioned above, discarding ordinary least squares and using discrete distributions such as Poisson, Negative binomial or double censored Tobit. Individual travel cost has also been preferred to Zonal travel cost([19]) as it offers the possibility to define travel cost for each individual with more precision and provides larger data sets that generate more robust estimates. TCM estimates have normally been higher than CVM ones for recreational use denying the possibility of hypothetical bias presence in CVM. Riera et al. (1994), Pérez y Pérez et al. (1996a and b) Campos et al. (1996) and Del Saz (1996) have used TCM and CVM to value the same protected area and CVM estimates are in mean 15% lower than TCM ones([20]). These results would corroborate those reviewed by Carson et al. (1996) for comparisons between revealed preferences methods and CVM, where the *ratio* between TCM and CVM estimates is 0.89.

CVM applications in Spain

While TCM can only be used to value recreational functions of natural areas, CVM can be applied to a wider scope of goods. Nevertheless, Spanish literature has focused on protected areas, with ten out of twelve CVM studies aimed at valuing this type of good([21]). The main characteristics of this studies can be found in table 4. Surveys have been done in person, all studies except for one, although professional interviewers have been seldom used due to their high cost. Members of the re-

([17]) Garrido et al. estimates are done in a per vehicle basis and mean occupation per vehicle is 4 persons so they must be divided by four in order to obtain then in a personal basis.
([18]) The formula to estimate consumer surplus divides the constant term by the coefficient for travel cost, as travel cost decreases this coefficient increases and, thus, consumer surplus is increased.
([19]) Zonal travel cost defines individuals in groups with equal travel cost and estimates the demand curve for trips with this grouped data.
([20]) Only Campos et al. (1996) obtain CVM estimates higher that travel cost ones.
([21]) The other two studies (Riera, 1989 and Riera, 1995) have been applied to urban infrastructures.

Table 2 ***Protected areas valuated in Spain.***

Good valued	Comunidad Autónoma	Protection Legal figure	Size (has.)	Habitat type*
l'Albufera	Valencia	Natural Park	21.000	7
Bértiz	Navarra	Natural Park	2.040	1
Canarias	Canary Islands	Natural Park*	28.000	3
Cuenca Alta del Manzanares	Madrid	Natural Park	46.728	2
Dehesa del Moncayo	Aragón	Natural Park	1.389	2
Montfragüe	Extremadura	National Park	17.852	2
Ordesa y Monte Perdido	Aragón	National Park	15.608	1
Pallars-Sobira	Cataluña	Not protected	1.355	1
Posets-Maladeta	Aragón	Park	33.267	1
Tablas de Daimiel	Castilla-La Mancha	National Park	1.928	6
Vega Motril	Andalucía	Not protected	1.000	-

* Habitat 1 stands for Atlantic and eurosiberian woods and mountains, Habitat 2 stands for Mediterranean mountains, Habitat 3 stands for macronesic woods, Habitat 6 stands for inland lakes and humid zones and Habitat 6 stands for marshes.
* This study values several natural parks together.

Table 3 ***TCM applications in Spain.***

Reference	Protected Area	Econometric specification	Travel cost used	Consumer surplus*
Loureiro y Albiac (1994)	PN Moncayo	Ordinary least squares with semi-logaritmic specification	13,9 pesetas/km + travel time 100% hourly wage + time at protected area 50% hourly wage	4.951
Riera et al. (1994)	Pallars-Sobirá	Zonal travel cost, direct integration under demand curve	15 pesetas/km	2.090
			10 pesetas/km	1.394
Pérez y Pérez et al. (1996a)	PN Ordesa y Monte Perdido	Poisson distribution	24 pesetas/km	4.018
			15 pesetas/km	2.511
			8 pesetas/km	1.339
		Negative binomial distribution	24 pesetas/km	3.864
			15 pesetas/km	2.411
			8 pesetas/km	1.284
Pérez y Pérez et al. (1996b)	PN Bértiz	Poisson distribution	24 pesetas/km + travel time 10% hourly wage	1.739
			15 pesetas/km + travel time 10% hourly wage	1.194
			10 pesetas/km + travel time 10% hourly wage	898
		Negative binomial distribution	24 pesetas/km + travel time 10% hourly wage	1.889
			15 pesetas/km + travel time 10% hourly wage	1.304
			10 pesetas/km + travel time 10% hourly wage	1.000
Del Saz (1996)	PN l'Albufera	Poisson distribution	24 pesetas/km	4.194
			15 pesetas/km	2.773
			7,7 pesetas/km	1.629
		Negative binomial distribution	24 pesetas/km	6.367
			15 pesetas/km	3.979
			7,7 pesetas/km	2.537
Garrido et al. (1996)	PN Cuenca Alta Manzanares	Tobit	23 pesetas/km + travel time 10% hourly wage	10.401
			23 pesetas/km + travel time 20% hourly wage	12.765
			23 pesetas/km + travel time 30% hourly wage	15.594
			23 pesetas/km P travel time 40% hourly wage	18.681
			23 pesetas/km + travel time 50% hourly wage	21.941
			23 pesetas/km + travel time 10% hourly wage + 10% time at protected area	20.350
			23 pesetas/km + travel time 20% hourly wage + 20% time at protected area	46.278
Campos et al. (1996)	PN Montfragüe	Zonal travel cost	10 pesetas/km	1.021

* Values in pesetas (exchange rate, April 1998, 157 pesetas = 1 US dolar)

search group carrying out the study or staff from the protected area being valued have been used as interviewers to reduce this cost. The effect of this option has been tested in Barreiro and Pérez y Pérez (1998) finding that the use of protected area staff can induce strategic behaviour as the relationship between the survey and future actions towards establishing entrance fees to the protected area is enhanced.

Studies have estimated use and non-use values and the latter have been discovered to be higher than the former. Payment vehicles have varied depending on which type of values we are estimating. For use values entrance fees have been used by all studies as it makes the market simulation more straightforward while for non-use values there has been more variation. Several studies have chosen an extra entrance fee that would be paid if conservation for future generations was to be assured. Other studies have used contributions to conservation funds or a raise in local taxes. Strategies to elicit non-use values when they are estimated together with use values have also been different.

If the same payment vehicle was used for both use and non-use values two strategies have been used: *i)* asking for global WTP and later decomposing this total value in use and non-use components *ii)* eliciting recreational use WTP and giving the chance to increase it if conservation is assured. Both approaches cannot obtain reliable estimates of WTP. In the first case, we must argue that estimates for values can be obtained but it is very difficult to decompose total value into it's different components (Cummings and Harrison, 1995). On the second case we are relating non-use value to the effective use of the resource as only visitors would be financing conservation of the protected area and thus the valuation scenario will not be credible.

The best strategy would be to use different payment vehicles and valuation scenarios for use and non-use values. This option has been used in Barreiro (1998) and Pérez y Pérez et al. (1998) where entrance fees were used to estimate use values and contributions to a fund for non-use values. In this way we have been able to detect that people accept best monetarization of use values than of no-use ones.

Regarding question formats the most used for use values has been the single-bounded dichotomous-choice with open-ended follow-up. This question format combines the advantages of both dichotomous-choice and open-ended formats making the valuation process easier to persons interviewed and allowing to obtain punctual information about individuals WTP. Using this question format also allows to obtain different estimates for WTP, dichotomous-choice and open-ended ques-

tions can be treated independently, that can be compared to see if the estimates obtained are reliable. On the other hand the selection of prices used for the dichotomous-choice question can affect answers to the open-ended question, starting point bias, making these answers unreliable. For non-use values open-ended question format has been the most used option.

Values obtained range from 590 to 1.328 pesetas per visit when estimating use values and from 442 pesetas per visit to 4.498 pesetas per year if we refer to non-use values. These results, specially those of recreational use value validate the use of CVM to estimate environmental benefits of protected areas as we can see that we are not obtaining the same value for any area we want to value. Del Saz et al.(1997) and Riera and Kristrom (1997) have tried to conduct a meta-analysis of all CVM studies carried out in Spain but value variation has been explained only by study characteristics and not by protected area characteristics. Future studies should have a common core design to allow to conduct new meta-analysis that could lead to a better understanding of CVM values. Non-use values are not comparable due to the different payment vehicles used but if we focus on those using the same elicitation strategy and payment vehicle we can also detect some level of variation, obtaining higher WTP for those areas which have a lower number of substitutes (National Parks) than for those relatively abundant in Spain.

Another important aspect is the extrapolability of estimates to the target population. The protected areas in Spain that have been studied have a very important number of visitors (ranging from over 600.000 to 140.000 visitors per year) and in order to have a representative sample you need over 400 valid observations. Protest rates([22]) have been found to be higher in non-use value studies than in recreational use ones, ranging the former between 55% and 3.3% and the latter from 41% to 0.7%([23]). We can see from **table 4** that many studies have failed to obtain results that can be extrapolated to the target population due to small sample sizes.

Final remarks

As we have mentioned throughout this paper environmental protection is playing a crucial role in environmental policy in the EU. In order to justify public expenditure in this objective we need to know whether the benefits generated by it are greater than the costs it implies. While the latter are easily calculated from expenditure budgets the former seldom appear in mone-

([22]) Protest rates are defined as the percentage of interviews were the hypothetical market proposed is rejected either by expressing zero WTP or by not answering the survey.

([23]) These values exclude the study where tax raise was used as payment vehicle which had the highest protest rates, over 60%.

Table 4 ***CVM applications to protected areas in Spain.***

Reference	Protected Area	Survey date	Survey mode	Values estimated	Payment	Question vehicle	Mean WTP* format	Effective sample size
Riera et al. (1994)	Pallars Sobirá	1994	in person	use non use	Entrance fee Entrance fee	SB-DC + OE OE	680 442	300 200
Rebolledo y Pérez (1994)	P.N. Dehesa del Moncayo	1994	in person	use non use	Entrance fee Entrance fee	SB-DC + OE OE	610 869	303 184
León (1994)*	protected areas in Canaay Islands	1993	telephone	non-use	Contribution to a fund	DB-DC	4.498	458
Calatrava (1996)	Vega Motril-Salobreña	1993	in person	non use	Tax raise	OE	660	116
Compos et al. (1996)	Monfragüe	1993	in person	use non use	Entrance fee Entrance fee	SB-DC + OE SB-DC + OE	1.328 1.353	349 406
Del Saz (1996)	L'Albufera	1995	in person	use non use	Entrance fee Entrance fee	OE OE	590 488	419 256
Barreiro (1998)	P.N. Ordesa y Monte Perdido	1995-96	in person	use non use	Entrace fee Contribution to a fund	SB-DC + OE OE	1.134 1.601	652 378
Pérez y Pérez et al. (1996b)	Señorío de Bértiz	1995	in person	use	Entrance fee	SB-DC + OE	734	372
Júdez et al. (1997)	Tablas de Daimiel	1995-96	in person	use	Entrance fee	SB-DC	943,4	366
Pérez y Pérez et al. (1997)	Posets-maladeta	1996	in person	use non use	Entrance fee Contribution to a fund	SB-DC + OE OE	824 2.827	382 314

* Values in pesetas (exchange rate, April 1998, 157 pesetas = 1 US dolar)
OE: Open ended; SB-DC: Dsingle bounded dichotomous choice; SB-DC + OE: Single bounded dichotomous choice with open-ended follow-up
DB-DC: Double bounded dichotomous choice
* This study has generated the following articles León (1995a and b; 1996a; b and c).

tary terms, thus we need to use the valuation methods developed by environmental economics to obtain monetary estimates of the environmental functions carried out by protected areas for society. These estimates need to be validated in order for them to be used by public sector to evaluate the rentability of expenditure in nature protection. Spain lags behind northern European countries in environmental externality incorporation to cost-benefit analysis. Most of the studies we have reviewed are only academic efforts to develop and/or improve the application of TCM and CVM in the Spanish context, even those which have been included in a cost-benefit analysis framework (Loureiro & Albiac, 1994; Rebolledo & Pérez y Pérez, 1994) are mere academic exercises. Nevertheless, these studies are being required by protected areas managers to justify further investments in these areas. The implementation of the Habitats directive is generating a demand for these studies which can help to obtain a better understanding of the limitations and possibilities of the TCM and CVM. Additional studies are needed to increase the number of observations and variety and depth of information on specific characteristics of recreational use of protected areas As mentioned by Boyle et al. (1994), future studies should define changes in recreational uses of protected areas in a clear and consistent manner, and carry this improved scenario design forward to data analysis and reporting of empirical results. With these improvements, researchers will be able to draw more firm conclusions regarding which characteristics. ●

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