

The willingness to pay for the conservation of mountain landscape in Cortina D'Ampezzo (Italy)

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Abstract

The growth of tourism in the mountain areas of the Veneto has encouraged the progressive abandoning of agriculture, which has led to major landscape changes. A contingent valuation approach was used to evaluate the benefits deriving from conservation of the rural landscape for tourists in Cortina d'Ampezzo. Two alternative market settings were adopted: one hypothetical (H) and one realistic (R). The willingness to pay of market H was more than double that of market R. The research demonstrated that hypothetical bias is quite common in landscape valuation. However, it has been verified that the use of calibration instruments can lead to more realistic estimates.

Keywords: Landscape; Contingent Valuation; Hypothetical Bias

1 Introduction

The mountain economy in the Veneto region has changed a great deal since the 1960s. Tourism, originally a marginal economic sector, having become the main activity. Tourism development, particularly in some valleys, has allowed the gap to narrow between the incomes of people living in mountain and urban areas. It has been estimated that tourists and day-trippers pay around 18 million day-visits to the Veneto mountains and that overnight stays in tourist facilities (hotels and extra-hotels) are ca. 11 million per year.

There has also been a strong reduction of the working population in agriculture and forestry, with many meadows and pastures being abandoned. Reasons for rural decline can firstly be ascribed to the lower profitability of mountain agriculture compared with the plain. Secondly, tourism development has strongly increased the opportunity cost of labour, by inducing a progressive senescence of the rural working population, hence a decline of the sector. The disappearance of farming changes the mountain landscape, particularly in the most frequented areas.

It is anyway not an easy task to determine whether current mountain landscape changes will lead to a decrease in tourists. This is mainly connected with landscape perception by tourists and their activities in mountain areas.

It is worth stressing that mountain areas have been receiving incentives for mowing meadows for many years. Recent Italian Laws have allowed municipalities to allocate grants to farmers who practice rural land conservation and management. It is thus important to verify whether these incentives are proportional to the tourist benefits connected to mountain landscape conservation.

Few studies have been carried out on monetary landscape evaluation, especially when considering the large number of studies in the field of scenic (non monetary) landscape assessment (Marangon, Tempesta, 2002). Monetary landscape evaluation is still difficult to implement due to the fact that landscape is a pure public good and the methods suggested in the literature contain several problems.

Methods based on *revealed preferences* (i.e. Travel Cost) are not well suited to landscape evaluation, and in any case are strongly affected by computational problems. They can also only assess direct use values (recreational value) and cannot be used to assess indirect use (passive) and non-use values.

On the other hand, methods based on *stated preferences* (i.e. Contingent Valuation - CVM) face relevant operative problems. Several authors have mentioned the poor reliability of this approach. Some authors in fact point out that the hypothetical contingent market determines an unavoidable lack of assessment reliability. Many studies found strong evidence that hypothetical willingness to pay (WTP) exceeds real WTP.

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MacMillan (2004), reviewing 50 experiments, found that in 34 studies the difference between hypothetical and real payment was statistically significant. Analysing the data collected by Murphy et al. (2003), it can be shown that the ratio between hypothetical and real payment exceeds 1.5 in 44% of reviewed studies. According to List and Gallett (2001), the difference between hypothetical and real values would be greater among pure public goods than among private goods. Nevertheless, several studies report that the use of some form of calibration helps to reduce hypothetical bias (Bjornstad et al, 1997; Carlson, 2000; Champ et al. 1997; Johannesson et al., 1999; List, 2003; MacMillan, Murphy et al., 2002; Smart and Thornburn, 1999).

Because the rural landscape is a pure public good, it can be hypothesised that the problem of the divergence between hypothetical and real WTP could be significant.

In order to verify if the CVM method can provide reliable estimates of the benefits due to landscape conservation, a survey was done in one of the most important centres of tourism in the Alps: the Cortina D'Ampezzo area. As in many Alpine valleys, the land covered by meadows and pastures in Cortina has greatly reduced over the past 30 years, from 1200 to little more than 400 hectares.

The survey has demonstrated that tourists take a moderate interest in the conservation of the mountain landscape. It has also emerged that extreme care must be taken when using CVM to make landscape estimates as it is all too easy to obtain highly overestimated values caused by hypothetical-type errors.

2 Benefits produced by the landscape

Researchers who have attempted to provide an estimate of landscape value have rarely tried to clarify what they mean by the term 'landscape' and the benefits which could derive from its conservation. Even if economists consider the rural landscape as a positive externality and as a pure public good, the concept of landscape is ambiguous and can be interpreted in very different ways.

Other scientific sectors have tried in the past to establish what landscape is. This can be summarised in at least three types of definitions:

- *historic-cultural*; the rural landscape derives from human alterations to the natural environment. Throughout the ages an area contains elements caused by past changes, so landscape has an historic and cultural dimension and can thus be considered an historic-cultural good.
- *perceptive*; according to Hull and Revell (1989), landscape is intended as "the outdoor environment natural or built, which can be directly perceived by a person visiting and using that environment"¹. Perception of the characteristics of the ecosystem (and therefore interpretation of landscape) was, especially in the past, a basic factor for the survival of an individual. In general man finds those landscapes pleasing which, in the past, were conducive to the survival of the species or with which he has acquired a reasonable degree of familiarity². The perceptive value of the landscape depends both on innate characteristics common to all mankind, and on characteristics typical of the social class and the territory where the individual finds himself³.
- *ecological*; landscape ecology defines landscape as a system of ecosystems or as a territory where ecosystems are organised by reciprocal spatial relationship. In this case every landscape (being a set of ecosystems) can provide a plurality of benefits. Costanza et al. (1997) suggested that ecosystems can yield 17 categories of benefits for man (both products and services). Included in these, they indicate the cultural and landscape ones. The approach proposed by landscape ecology cannot in reality establish which benefits are provided by the landscape because, considering it by the same standards as a set of ecosystems inevitably identifies the benefits provided by the landscape with the many goods and services provided by the environment as a whole.

It therefore appears that the rural landscape, being the outcome of the territorial organisation of farming ecosystems, can provide benefits of

¹ The European Landscape Convention gives a similar definition:

"Landscape" means an area, as perceived by people, whose character is the result of the action and interaction of natural and/or human factors".

² For an analysis of the factors determining perception of the landscape, see Kaplan and Kaplan, 1989.

the historic-cultural type and benefits of the perceptive type. It should also be stressed that, as natural or semi-natural ecosystems (for example woodlands) do not have an historic dimension, they have a basically limited historic-cultural value.

For a better understanding of which categories of benefits the landscape can provide, it is worth referring to the classification of the value of environmental resources proposed by the Secretariat of the Convention on Biological Diversity (SCBD, 2001):

Use value (past or actual; optional; quasi optional)	direct	extractive
		non extractive
	indirect	
Non use value		existence
		bequest
		vicarious

The central factor that can differentiate the various types of benefits is the relationship established between an individual and the environmental good. In the absence of physical interactions of any kind, either voluntary or involuntary, these are non use values. When there are interactions of the physical-perceptive type, but involuntary, values of indirect (or passive) use are obtained. When, instead, there are interactions of the voluntary physical type, values of direct use are obtained that can be of the extractive type, if it involves the extraction of material goods, or the non extractive type, if these are non-material benefits.

As regards landscapes there can be:

- a) direct-non extractive use benefits, when an individual visits an area with a pleasant landscape for recreational purposes; however, the importance of landscape in the determination of the recreational value of the area depends essentially on the type of recreational activity carried out. Daniel et al. (1989) found the presence of a linear relationship between perceived scenic beauty and the WTP to visit (or camp in) a forest;
- b) indirect use benefits usually connected to home ownership in an area where the landscape is more pleasing⁴;
- c) non-use benefits due to the conservation of the landscape as an historic-cultural good.

It can thus be inferred that the value attributed to landscape conservation tends to increase for individuals who visit a given area more often or who own a home there. In the case of many historic landscapes, the conservation value can also be quite high, especially where characteristics of uniqueness and non-reproducibility exist, or where there are traditional rural buildings, dry-stone walls and other easily recognisable hydraulic systems of the past. However, it should be noted that in Alpine areas the meadows have usually been formed without making any particular changes to the territory, so the landscape of which they form a part has a low historic-cultural value.

3 Previous studies

There have been few estimates of landscape value internationally⁵. A literature search showed that most monetary valuations of the landscape have been done in Europe (table 1). In the United Kingdom and Italy there have been a total of 15 studies in this sector, of which 9 were in the UK and 6 in Italy. The majority of research studies were published in the nineties.

³ Much research has been done in the field of the perceptive and visual valuation of the landscape. For example: Daniel, Booster, 1976; Brown, Daniel, 1986; Brown, Daniel, 1991; Gobster, Chenoweth, 1989; Gregory, Davis, 1993; Penning-Roswell, 1982; Whittow, 1979.

⁴ Although it is true that the choice of buying a home is also affected by landscape quality, the choice is generally affected by a number of considerations. Moreover, once the home has been bought, it will not be sold for some time, even if quite important changes to the landscape occur.

⁵ I.e.: Bamber and Khoury (1999); Beaseley et al. (1986); Bullock and Kay (1997); Cicia and Scarpa (1999); Colson and Stenger-Letheux (1996); Daniel et al. (1989); Drake (1992); Dillmann and Bergstrom (1991); Garrod and Willis (1995), Garrod et al. (1994); Hanley et al. (1998); Hanley and Ruffell (1992); Halstead (1984); Leischer and Tsur (2000), Leon (1995); Marangon and Tempesta (2001); Prukner (1994), Schläpfer and Hanley (2003); Signorello et al.(2001); Tempesta (1998); Willis and Garrod (1991); Willis and Garrod (1993); Willis and Garrod (1992).

Most studies used contingent valuation in the *open ended* format. Only in the more recent investigations has the dichotomous method been used, which, moreover, provided better estimates than those with the *open ended*. A simulation of a referendum was done in only one case. In general, the payment method was in the form of an increase in taxes, but in some studies a donation to public-private trusts was hypothesised.

The results obtained in the different studies are extremely heterogeneous and cannot usually be compared with one another because:

- the surface area is sometimes not reported, so a value per hectare cannot be obtained;
- in some cases there is no certainty as regards the overall value of the landscape as the population size, to which to refer the estimated average values, is unclear;
- often, especially in the British studies, the definition of landscape is somewhat dubious, because the interviewees were sometimes clearly informed that a given landscape order contributed towards the conservation of various animal and plant species;
- the values refer to different countries and years, so each must be deflated with the correct deflators, and the transforming into a single reference currency could also be ambiguous given the different average incomes and cost of living in the countries.

A review of the studies done in the UK by Hanley et al. (1998) highlights some interesting elements. Most importantly, the estimates made with the dichotomous choice method tend to markedly overestimate the value of the landscape.

It can also be noted that the value attributed by the residents is similar (between 13 and 31 £ sterling per family per year). This would appear to be due to the fact that the landscape value is to be taken mainly as a use value, that of being able to live or practice recreational activities in a more pleasant environment. The situation for tourists is more ambiguous, even if their WTP appears to be lower than that of the residents.

The picture is much more complex in the case of non-visitors, which would, in practice, be a pure value of existence. According to some estimates it would be higher than that of visitors (Bullock and Kay, 1996), according to others around 8-10 times lower (Willis and Garrod, 1993).

Table 1 Studies of monetary valuation of the landscape by country

Countries	Studies	
	n.	%
UK	9	37.50
Italy	6	25.00
USA and other	5	20.83
Other Europe	5	20.83
Total	24	100.00

Considering the studies done in Italy, it should first be mentioned that they greatly differ in terms of the definition of the good being estimated, method of payment and individuals involved in the survey. In the four studies in which CVM was used, WTP for landscape conservation adopted highly variable amounts (table 2).

The highly diverse estimated values could be linked to the different types of landscape being estimated, but also the different payment method used and organisation of the contingent market. Thus areas on the plain obviously have a lower appreciation than those in the hills, although the differences of the amounts do not appear entirely plausible. It should also not be forgotten that the value of the Etna area was defined by asking for a single payment, while a continuing WTP over time was asked in the other cases.

4 Survey methods

A sample of visitors was asked, in an interview, to express their willingness to contribute to the conservation of meadows through a donation to a public-private trust with the purpose of paying grants to farmers who undertake to mow the meadows, thus inhibiting further encroachment of the woodland⁶. The reason for the donation is therefore that of avoiding the woodlands reclaiming the remaining 400 hectares of meadows still present in the valley bottom and at medium altitudes.

Regarding this, pictures portraying the original landscape of the valley were first of all shown to interviewees, to help them understand the past landscape. They were asked to declare both their WTP pay into the fund (using an open ended approach) and to indicate for how long (number of years) they would be willing to pay such an amount. Although some authors consider the open ended approach not incentive compatible, analysis of the Murphy et al. (2003) data suggests that a dichotomous choice approach could stress the divergence between hypothetical and real WTP when evaluating public goods⁷.

In order to account for the problem of divergence between hypothetical and real WTP, the interviews differed slightly between the two split samples. The first group of interviewees were simply asked to declare their WTP (sample *H*). The second group (sample *R*), before asking their WTP, had been told that if they indicated a positive WTP they would then be asked their address and telephone number in order to mail them the paying-in slip for the amount declared. Although we cannot make people really pay for the declared amount of money, the described scenario is quite realistic⁸. In this case a calibration instrument was used in order to enhance the realism of the scenario.

Table 2 Monetary landscape valuation studies in Italy.

Source	Study area	WTP	Elicitation method	Payment vehicle
Tempesta, 1998	Plain between Isonzo and Tagliamento River	14.9 euro per family per year	OE	Mixed
Marangon & Tempesta, 2001	Whole Friuli Venezia Giulia hills	395.4 euro per family per year	CV	Tax
Marangon & Tempesta, 2001	Collio hills	73.3 euro per family per year	CV	Tax
Marangon & Tempesta, 2001	West hills	112.5 euro per family per year	CV	Tax
Cicia & Scarpa, 1999	Cilento National Park	18.0 euro per family per year *	CV	Local tax
Signorello, Pappalardo & Pulvirenti, 2001	Etna area	51.6 euro one shot per family	OE - CV	Donation

* Figure estimated using Cicia and Scarpa (1999) data.

⁶ According to some authors a donation cannot provide a correct estimate of the Hicksian surpluses because of the presence of the free-rider problem. Champ and Bishop (2001) demonstrated that for many goods a donation constitutes the only credible contingent market. For example, for goods of local interest, such as the landscape in an Alpine valley, the hypothesis of holding a referendum appears unlikely, especially if the aim of the referendum is the implementation of a new tax.

⁷ Cummings et al. (1997) experimental results questioned the possibility that hypothetical referenda can be considered incentive compatible.

⁸ Although the interviewee did not in fact pay, during the interview he was convinced that he would do so in the following days. The WTP_R can thus in many respects be considered "real".

Finally, interviewees were asked to indicate for how many years in the future they intended to make the donation.

During summer 2003, 504 visitors to Cortina were interviewed in person. Of these, 253 were given questionnaire *R* and 251 questionnaire *H*. In addition to the data relating to willingness to pay to preserve the remaining 400 hectares of meadows, information was also gathered which would be useful for understanding the motives behind that willingness to pay. More specifically: type of holiday accommodation; length of holiday; holiday location; years between 1991 and 2002 when the valley had been visited; recreational activities during the holiday; socio-economic details (age, sex, income, level of education). They were also asked to indicate, using a Lickert scale, which factors contribute towards making the landscape more pleasing and which instead detract from it.

5 The studied territory and characteristics of the interviewees

Cortina d'Ampezzo is probably one of the best-known centres of tourism in the Alps. The administrative district covers an area of 25,800 hectares, surrounded by Dolomite peaks of around 3,000 metres a.s.l. The town is positioned in the bottom of a broad valley, from which landscapes of incomparable beauty are visible. In 1990 part of the territory became a Nature Park, attracting innumerable visitors.

The area is intensively frequented by visitors: it has been estimated that during the summer season no less than 800,000 visits are paid by circa 2-300,000 individuals (Da Pozzo et al., 2003). The visitors are both day-trippers and tourists who stay one or more nights in the many hotels and guesthouses in Cortina and surrounding areas.

The sample of interviewees reflects most of the characteristics of visitors to Cortina (Da Pozzo et al., 2003). 55% of interviewees were male and 45% female (table 3). Average age was 45 years, with an educational level above that of the national average: 59.3% with high school qualifications and 7.5% with a degree. Almost 70% of interviewees had a family income of 10,000 - 30,000 euro.

More than half of those interviewed were holidaying in a hotel and the number of day-trippers was also quite high (19.4%) (table 4). 47.4% of the interviewees were on holiday in Cortina and 15.9% came from nearby in the Cadore area. Few were visiting Cortina while on holiday in more distant locations in the Veneto or South Tyrol. Holiday length was generally two (42.5%) or three weeks (22.4%).

Around one third of interviewees were visiting Cortina for the first time in 2003, while about 20% had holidayed in Cortina more than six times in the previous eleven years. In general, it is the hotel guests who are the least faithful to the area.

Analysis of the chi-squared test demonstrates that the two sub-samples *H* and *R* do not differ statistically.

6 Results

The WTP declared by the interviewees was 7.09 euro/year for sub-sample *H* (c.i. 95% 6.20 ÷ 7.96) and 3.25 euro/year for sub-sample *R* (c.i. 95% 2.58 ÷ 3.92), respectively (table 5)⁹. The ratio between the values is 2.18 and is therefore very close to the average ratio of 2.60 between the hypothetical and real values obtained by Murphy et al. (2003) through a meta-analysis of experiments conducted in this field. The NOAA Panel experts (1994) also suggested the adoption of a calibration factor equal to 2 in the evaluation of passive non-use values.

The difference between the two split samples can be mainly ascribed to the different percentage of people who expressed the wish to contribute towards landscape conservation. People willing to pay in sample *R* were 33.7%, while they were 69.8% in sample *H*¹⁰. Average WTP among willing to paying people in both samples is the same (10.15 euro / year for sub-sample *H* and 9.67 euro/year for sub-sample *R*)

¹¹ Hypothetical contingent market induces more people to declare their willingness to pay, but it seems not to affect the specific amount of money.

⁹ Frequency distribution analysis of the declared WTP identified seven outliers which were excluded in the analysis.

¹⁰ In the estimates of landscape valuation done by Cicia and Scarpa (1999) and Tempesta (1998), the percentage of people willing to pay was 69% and 76%, respectively, very similar percentages to those found in sub-sample *H*.

¹¹ The two values do not differ with 95% probability.

Table 3 Sample socio-economic and holiday characteristics

Gender	Split sample H		Split sample R		Total	
	n.	%	n.	%	n.	%
female	112	44.6	113	44.7	225	44.6
male	139	55.4	140	55.3	279	55.4
Total	251	100.0	253	100.0	504	100.0

Chi-Square = 0.0001; sig. = 0.9923

Age	Split sample H		Split sample R		Total	
	n.	%	n.	%	n.	%
less than 30 years	35	13.9	32	12.6	67	13.3
from 30 to 39 years	50	19.9	62	24.5	112	22.2
from 40 to 49 years	65	25.9	50	19.8	115	22.8
from 50 to 59 years	52	20.7	59	23.3	111	22.0
60 and more years	49	19.5	50	19.8	99	19.6
Total	251	100.0	253	100.0	504	100.0

Chi-Square = 3.8202; sig. = 0.4309

Education level	Split sample H		Split sample R		Total	
	n.	%	n.	%	n.	%
primary school	21	8.4	33	13.0	54	10.7
secondary school	57	22.7	55	21.7	112	22.2
high school	149	59.4	150	59.3	299	59.3
university graduate	24	9.6	15	5.9	38	7.5
Total	251	100.0	253	100.0	504	100.0

Chi-Square = 5.3821; sig. = 0.2503

Income (euro x 1000)	Split sample H		Split sample R		Total	
	n.	%	n.	%	n.	%
less than 10	18	7.2	18	7.1	36	7.1
from 10 to 20	112	44.6	124	49.0	236	46.8
from 20 to 30	59	23.5	56	22.1	115	22.8
from 30 to 40	33	13.1	31	12.3	64	12.7
more than 40	29	11.6	24	9.5	53	10.5
Total	251	100.0	253	100.0	504	100.0

Chi-Square = 1.2147; sig. = 0.8757

Table 4 Sample holiday characteristics

Accommodation	Split sample H		Split sample R		Total	
	n.	%	n.	%	n.	%
Day-trippers	44	17.5	54	21.3	98	19.4
Hotel	139	55.4	138	54.5	277	55.0
Rented house	34	13.5	29	11.5	63	12.5
Camping	13	5.2	14	5.5	27	5.4
Holiday Home	10	4.0	12	4.7	22	4.4
Agritourism. etc	4	1.6	3	1.2	7	1.4
Friends and parents	7	2.8	3	1.2	10	2.0
Total	251	100.0	253	100.0	504	100.0

Chi-Square = 3.3747; sig. = 0.7606

Place where holiday is spent	Split sample H		Split sample R		Total	
	n.	%	n.	%	n.	%
Day-trippers	44	17.5	54	21.3	98	19.4
Cortina	128	51.0	111	43.9	239	47.4
Cadore	35	13.9	45	17.8	80	15.9
Other Veneto	14	5.6	16	6.3	30	6.0
Other Region	30	12.0	27	10.7	57	11.3
Total	251	100.0	253	100.0	504	100.0

Chi-Square = 3.7630; sig. = 0.4390

Length of holiday	Split sample H		Split sample R		Total	
	n.	%	n.	%	n.	%
Day-trippers	44	17.5	54	21.7	98	19.6
from 2 to 6 days	16	6.4	13	4.7	27	5.6
from 7 to 13 days	107	42.6	107	42.3	214	42.5
from 14 to 20 days	60	23.9	53	20.9	113	22.4
from 21 to 27 days	13	5.2	12	4.7	25	5.0
more than 28 days	11	4.4	14	5.5	25	5.0
Total	251	100.0	253	100.0	504	100.0

Chi-Square = 2.6194; Sig. = 0.7584

Number of years of holiday in the past 11 years	Split sample H		Split sample R		Total	
	n.	%	n.	%	n.	%
no past vacation or day-trippers	118	47.0	122	48.2	240	47.6
1 year	24	9.6	20	7.9	44	8.7
2 years	18	7.2	19	7.5	37	7.3
from 3 to 5 years	39	15.5	35	13.8	74	14.7
from 6 to 8 years	22	8.8	23	9.1	45	8.9
from 9 to 11 years	30	12.0	34	13.4	64	12.7
Total	251	100.0	253	100.0	504	100.0

Chi-Square = 0.9378; sig. = 0.9674

Table 5 Willingness to pay and years of payment in order to preserve the meadows of Cortina d'Ampezzo valley.

	N	mean yearly WTP (euro)	average years of payment	mean total WTP (euro)	% interviewed willing to pay
sample H (no calibration)	245	7.09 (0,4461)	7.05 (0,5643)	60.27 (6,2361)	69.80 (2,9393)
sample R (calibration)	252	3.25 (0,3392)	3.62 (0,4690)	27.48 (3,9946)	33.73 (2,9842)
Total	497	5.14 (0,2919)	5.31 (0,3736)	43.65 (3,7506)	51.51 (2,2441)

Standard error in brackets

Quite similar findings were found in other research. Foster et al. (1997) found that 5 to 7% of people have in practice made donations to environmental protection, whereas the percentage obtained in comparable hypothetical markets varied between 19 and 95%. At the same time, the average payment of those who really made a donation is similar to the average WTP declared in the hypothetical markets. Champ and Bishop (2001) indicate that in the hypothetical market 43% of interviewees declared themselves willing to pay and in reality only 23% made the payment.

Sub-sample *H*, not only overstates the average amount of money they were willing to pay, but also the number of years they will pay in the future. The average number of years of payment is equal to 7.05 for sub-sample *H* and 3.25 for sub-sample *R*. Discounting the future individual WTP by a rate of 3%, total WTP_H is equal to 60.27 euro and total WTP_R 27.48 euro (ratio = 2.2).

In sample *R* the percentage of people willing to pay was strongly affected by the place where they were spending the holiday, whereas in sub-sample *H* it was not. In sub-sample *R* the percentage of people willing to pay on holiday in Cortina is 37%, whereas it lowers to 19% among people on holiday elsewhere. In sub-sample *H* the willing to pay rate of people on holiday in Cortina is 74%, whereas the percentage of people on holiday in other valleys is 60%. We might say that the strong reality of market *R* has induced interviewees to fit their WTP to the benefits they receive, since people on holiday in the Ampezzo valley can benefit from a more scenic landscape compared to people on holiday elsewhere.

To improve our knowledge about people's behaviour in the contingent market setting, we estimated two statistical regression models.

The first is an OLS model which tries to analyse which individual characteristics affect the WTP amount (table 6). The second is a logistic model which tries to explain which factors can influence the probability that an individual will be willing to pay for landscape conservation (table 7). In both cases the covariates were selected using a stepwise forward selection procedure.

The OLS model highlights that the WTP is strongly affected by the calibration instrument used.

According to the model the WTP_H is 4 euro higher than the WTP_R . Higher WTP was also declared by individuals with a higher income, who have regularly visited the valley in the past and who are currently taking a longer holiday. WTP is lower for those who are holidaying in a hotel or rented accommodation, i.e., those who are less likely to return in the future. Type of activity also affects the WTP. Those who visit the *malghe* (medium-high altitude meadows) are more willing to contribute towards landscape conservation. On the contrary, those who pass the time gathering mushrooms, being less interested in exploiting the landscape, have a lower WTP.

Reasonably similar results were obtained with the logistic model (table 7). The factors determining the magnitude of the WTP are not unlike those which determine the probability that an individual is willing to pay. However, the logistic model elucidates the fact that those who take their main holidays in another region are less willing to contribute to the conservation of the landscape in Cortina. The probability that an individual declares himself willing to pay also depends on the level of appreciation declared for landscapes with alternating meadows and woodland.

Table 6 Factors affecting interviewees willingness to pay

R	R ²	Adjusted R ²	Std. Error			
0.5197	0.2701	0.2551	5.6157			

	Sum of Squares	df	Mean Square	F	Sig.
Regression	5671.32	10	567.13	17.98	0.000
Residual	15326.65	486	31.54		
Total	20997.96	496			

	B	Std. Error	t	Sig.
(Constant)	2.6712	0.7470	3.5760	0.0004
income	0.1713	0.0251	6.8352	0.0000
calibration	-4.0215	0.5069	-7.9331	0.0000
years of visit	0.2234	0.0716	3.1213	0.0019
CAI	2.6729	1.1345	2.3561	0.0189
pasture	1.3523	0.5620	2.4063	0.0165
rented house	-3.6665	0.9847	-3.7236	0.0002
hotel	-1.4902	0.5809	-2.5652	0.0106
length of holiday	0.0935	0.0390	2.3963	0.0169
mushroom	-2.9945	1.4116	-2.1214	0.0344
graduate	1.7495	0.9922	1.7632	0.0785

note: **income** = family income per year; **calibration** = dummy variable use of calibration instrument (yes=1) or sub-sample R = 1; **years of visit** = number of visits to Cortina valley in the past 11 years; **CAI** = dummy variable membership of Italian Alpine Club (yes=1); **pasture** = dummy variable visit to high altitude pasture and dairy (*malghe*) (yes =1); **rented house** = dummy variable holiday in a rented house (yes=1); **hotel** = dummy variable holiday in a hotel; **length of holiday** = mountain days of holiday in 2003; **mushroom** = dummy variable mushroom picking during the holiday (yes=1); **graduate** = dummy variable person with a university degree (yes=1).

Table 7 Factors affecting the probability that interviewees are willing to pay (logistic model)

-2 Log Likelihood	552.116
Goodness of Fit	487.836
Cox & Snell R ²	0.24
Nagelkerke R ²	0.32
Chi-Square	136.42
Chi-Square Significance	0.0000
Percent Correct	70.02%

	B	S.E.	Wald	sign.
other region	-0.6864	0.3514	3.8166	0.0507
hotel	-0.6146	0.2484	6.1213	0.0134
rented house	-1.8404	0.4373	17.7109	0.0000
length of holiday	0.0331	0.0174	3.6298	0.0568
pasture	0.7345	0.2353	9.7479	0.0018
mead-wood	+0.4813	0.1918	6.2979	0.0121
calibration	-1.9304	0.2234	74.6504	0.0000
income	0.0401	0.0107	13.97	0.0002
years of visit	0.0714	0.0299	5.6996	0.0170
constant	0.7438	0.4169	3.1835	0.0744

note: **other regions** = dummy variable holiday in other region (yes=1); **income** = family income per year; **calibration** = dummy variable use of calibration instrument (yes=1) or sub-sample R = 1; **years of visit** = number of visits to Cortina valley in the past 11 years; **pasture** = dummy variable visit to high altitude pasture and dairy (*malghe*) (yes =1); **mead-wood** = factors improving landscape quality: presence of meadows and woods (Likert scale 1 to 4); **rented house** = dummy variable holiday in a rented house (yes=1); **hotel** = dummy variable holiday in a hotel; **length of holiday** = days of mountain holiday in 2003;

Both models thus provide a coherent and reliable interpretative framework. In general, individuals with a higher income are more willing to pay for pure public goods. In addition, the declared WTP mainly assumes a use value (direct-non extractive and indirect), being higher for those on holiday in Cortina or in the neighbouring districts, who have been coming on holiday for many years and who have long holidays. This finding is coherent with our hypothesis on the nature of landscape benefits.

Calculating the ratio between WTP_H and WTP_R (CF) we found that some individuals are particularly prone to hypothetical bias:

- income less than 10,000 euro per year: CF = 3.36
- length of holiday less than one week: CF = 4.54
- no previous Cortina valley visit: CF = 3.18
- main holiday in other region: CF = 4.88
- holiday in a rented house: CF = 3.19
- sample average CF = 2.17

The data highlight that there are probably two sources of hypothetical bias: the buying of moral satisfaction and the sponsor compliance bias. These sources of bias are particularly strong when people are not directly involved in the use of the resources, even if the hypothetical bias appears to be quite erratic.

7 Conclusions

The investigation has demonstrated that the conservation of the mountain landscape in the Cortina d'Ampezzo valley involves an increase in the benefits enjoyed by the tourists. The magnitude of the declared WTP is certainly higher than the cost of the conservation of the areas still cultivated as meadows at medium and low altitudes. Conservation of the traditional landscape is considered positively both by those who take a holiday in Cortina and by day-trippers, although amongst the former, especially if owners of second homes, the WTP is much higher. However, the research has also shown that, when estimating the benefits coming from conservation of the mountain landscape, it is necessary to pay close attention to the hypothetical bias. As with other pure public goods, many individuals who declare themselves hypothetically willing to pay, are not in reality inclined to use their income for landscape conservation. The research has demonstrated that the true source of error comes from the fact that the number of people who declare that they are willing to pay in the hypothetical markets is in reality much higher than those willing to pay in the real markets. This result is in many ways coherent with the "mental accounting" hypothesis formulated by Thaler (1985): every individual sets aside a given amount for the purchasing of a given category of goods and, within the ambits of contingent valuation, tends to declare exactly that amount, independently of the good to which it should actually be assigned. Once forced to pay, the interviewees have realised that spending part of their income to conserve the Cortina landscape would no longer allow them to contribute towards conserving the landscape in areas they visit more regularly, or which they will very likely frequent in the future. In CVM, interviewees probably provide reliable values regarding the portion of their income which they are prepared to relinquish, but unreliable with regards to the specific environmental good on which they will spend that amount.

The study has, however, demonstrated that an opportune organisation of the contingent market can encourage greater realism in the WTP of interviewees. It was sufficient to state early in the interview that the declared WTP must later be paid to drastically reduce the number of individuals willing to contribute. Obviously, this does not signify that the hypothetical bias will be entirely eliminated in this way. Only a comparison with the real market would allow this type of statement to be made. Analysis of the research in the literature in this sector appears to make it possible to claim that the organisation of the contingent market proposed to sub-sample *R* allows values very close to the real ones to be obtained.

Although it is thus true that an estimate of pure public goods with CVM might provide exaggeratedly high values, it is equally clear that the use of calibration instruments can markedly improve the estimates. Despite this, it cannot be forgotten that the use of calibration instruments faces problems when simulating referenda, so difficulties remain in estimating the value of large-scale agro-environmental policies.

References

- Bamber B.R. and Khoury G.A. (1999). Contingent valuation of landscape. *Journal of Transport* 135: 185-194.
- Beaseley S., Workman W. and Williams N. (1986). Estimating amenity values of fringe farmland: a contingent valuation approach. *Growth and Change* 17: 70-78.
- Bjornstad D., Cummings R. and Osborne L. (1997). A learning design for reducing hypothetical bias in the contingent valuation method. *Environmental and Resource Economics* 10: 207-221.
- Brown T. and Daniel T. (1986). Predicting scenic beauty of timber stands. *Forest Science* 32: 471-487.
- Brown T. and Daniel T. (1991). Landscape aesthetics of riparian environments: relationship of flow quantity to scenic quality along a wild and scenic river. *Water Resources Research* 27: 1787-1795.
- Bullock C.H. and Kay J. (1997). Preservation and change in the upland landscape: the public benefits of grazing management. *Journal of Environmental Planning and Management* 40: 315-334.
- Carlson J. L. (2000). Hypothetical surveys versus real economic commitments: further evidence. *Applied Economic Letters* 7: 447-450.
- Champ P.A., Bishop R.C., Brown T.C. and McCollum D.W. (1997). Using donation mechanisms to value nonuse benefits from public goods. *Journal of Environmental Economics and Management* 33: 151-162.
- Champ P.A. and Bishop R.C. (2001). Donation payment mechanisms and contingent valuation; an empirical study of hypothetical bias. *Environmental and Resources Economics* 19: 383-402.
- Cicia C. and Scarpa R. (1999). La disponibilità a pagare per il paesaggio rurale nel Cilento: paradigmi interpretativi del metodo of the valuation contingente. *Rivista di Economia. Agraria LIV*: 55-94.
- Colson F. and Stenger-Letheux A. (1996). Evaluation contingente et paysage agricoles, application au bocage de Loire-Atlantique. *Cahier d'économie rural*, n.39-40.
- Costanza R., D'Arge R., De Groot R., Farber S., Grasso M., Hannon B., Limburg K., Naeem S., O'Neil R., Paruelo J., Raskin R.G., Stton P. and Van Den Belt M. (1997). The value of the world's ecosystem services and natural capital. *Nature* 387: 253-260.
- Daniel T.C. and Boster R.S. (1976). Measuring landscape esthetics: the scenic beauty estimation method. *USDA Forest Service Research Paper RM-167*. Rocky Mountain Forest and Range Exp. Stn., Fort Collins, CO. 66 p.
- Daniel T.C., Brown T.C., King D.A., Richards M.T. and Stewart W.P. (1989). Perceived scenic beauty and contingent valuation of forest campgrounds. *Forest Science* 35: 76-90.
- Da Pozzo M., Tempesta T. and Thiene M. (2003). Turismo e attività recreational a Cortina D'ampezzo. *FORUM*, Udine.
- Drake L. (1992). The non-market value of the Swedish agricultural landscape. *European Review of Agricultural Economics* 19: 351-364.
- Dillmann B.L. and Bergstrom J.C. (1991). Measuring environmental amenity benefits of agricultural land. in Hanley N. (ed.), *Farming and countryside: an economic analysis of external costs and benefits*. Wallingford, CAB International.
- Garrod G.D. and Willis K.G. (1995). Valuing the benefits of the South Downs environmentally sensitive area. *Journal of Agricultural Economics* 46: 160-173.
- Garrod G.D., Willis K.G. and Saunders C.M. (1994). The benefits and costs of Somerset Levels and Moors ESA. *Journal of Rural Studies* 10: 131-145.
- Gobster P.H. and Chenoweth R.E. (1989). The dimension of aesthetic preference: a quantitative analysis. *Journal of Environmental Management* 29: 47-72.
- Gregory K.J. and Davis R.J. (1993). The perception of riverscape aesthetics: an example from two Hampshire rivers. *Journal of Environmental Management* 39: 171-185.

- Hanley N., MacMillan D., Wright R.E., Bullock C., Simpson I., Parisson D. and Crabtree B. (1998). Contingent valuation versus choice experiments: estimating the benefits of environmentally sensitive areas in Scotland. *Journal of Agricultural Economics* 49: 1-15.
- Hanley N.D. and Ruffell R.J. (1992). The contingent valuation of forest characteristics: two experiments. *Journal of Agricultural Economics* 44: 218-229.
- Halstead J. (1984). Measuring the non-market value of Massachusetts agricultural land: a case study. *Journal of Northeastern Agricultural Council*, n.13.
- Hull R.B. and Revell G.R.B. (1989). Issues in sampling landscapes for visual quality assessments. *Landscape and Urban Planning* 17: 323-330.
- Johannesson M., Blomquist G.C., Blumenschein K., Johansson P., Liljas B. and O'Connor R.M. (1999). Calibrating hypothetical willingness to pay responses. *Journal of Risk and Uncertainty* 8: 21-32.
- Kaplan S. and Kaplan R. (1989). *The experience of nature: a psychological perspective*. Cambridge, Cambridge University Press.
- Leischer A. and Tsur Y. (2000). Measuring the recreational value of agricultural landscape. *European Journal of Agricultural Economics* 27: 385-398.
- Leon C.J. (1995). El metodo dicotomico de valoracion contingente: an aplicacion a los espacios naturales en Gran Canaria. *Investigaciones Economicas* 19: 83-106.
- List J. and Gallet C.A. (2001). What experimental protocol influences the disparities between actual and hypothetical stated values?. *Environmental and Resources Economics* 20: 241-254.
- List J.A. (2001). Do explicit warnings eliminate the hypothetical bias in elicitation procedures? Evidence from field auctions for Sportscards. *American Economic Review* 91: 1498-1507.
- MacMillan D.C., Smart T. and Thorburn A. (1999). A field experiment involving cash and hypothetical charitable donations. *Environmental and Resource Economics* 14: 399-412.
- MacMillan D. (2004). Actual and hypothetical willingness to pay for environmental outputs. University of Aberdeen, SEERAD Report, January.
- Marangon F. and Tempesta T. (2002). La valutazione monetaria del paesaggio rurale: esperienze nazionali e internazionali. *Valutazione Ambientale* 1: 68-74.
- Marangon F. and Tempesta T. (2001). L'impatto paesaggistico della viticoltura collinare. Un valutazione economica nella zona DOC dei "Colli Orientali del Friuli". In Marangon F. and Tempesta T.(eds.), *La valutazione dei beni ambientali come supporto alle decisioni pubbliche. Una riflessione alla luce delle normativa comunitaria e nazionale FORUM*, Udine, 115-133.
- Murphy J., Stevens T. and Weatherhead D. (2002). An empirical study of hypothetical bias in voluntary contribution contingent valuation: does cheap talk matter?. Department of Resource Economics Working Paper, 2003-2, University of Massachusetts-Amherst.
- Murphy J.J., Allen P.J., Stevens T.H. and Weatherhead D. (2003). A meta-analysis of hypothetical bias in stated preference valuation. University of Massachusetts.
- Penning-Rowsell E.C. (1982). A public preference evaluation of landscape quality. *Regional Studies* 16: 97-112.
- Prukner G.J. (1994). Agricultural landscape and cultivation in Austria: an application of the CVM. *European Review of Agricultural Economics* 22: 173-190.
- SCBD Secretariat of the Convention on Biological Diversity (2001). *The value of forest ecosystems*. Montreal, SCBD, 67p. (CBD Technical Series n.4).
- Signorello G., Pappalardo G. and Pulvirenti G. (2001). Il valore del paesaggio agrario nell'area settentrionale dell'Etna. In Tempesta T. and Marangon F. (eds.), *La valutazione dei beni ambientali come supporto alle decisioni pubbliche. Una riflessione alla luce della normativa comunitaria e nazionale*. Forum Editrice Universitaria, Udine, 101-113.

Schläpfer F. and Hanley N. (2003). Do local landscape patterns affect the demand for landscape amenities protection?. *Journal of Agricultural Economics* 54: 21-34.

Tempesta T. (1998). The economic value of rural landscape: an application to the area between Isonzo and Tagliamento Rivers (Friuli-Venezia Giulia). In R.C. Bishop, D. Romano (eds.) "Environmental resource valuation. Application of the contingent valuation method in Italy", Dordrecht :Kluwer Academic Publisher, 213-232.

Thaler R. (1985). Mental accounting and consumer choice. *Marketing Science* 4: 199-214.

Willis K. and Garrod G. (1991). Landscape values: a contingent valuation approach and a case study of the Yorkshire National Park. ESCR working paper 21.

Willis K. and Garrod G. (1993). Valuing landscape: a contingent valuation approach. *Journal of Environmental Management* 37: 1-22.

Willis K. and Garrod G. (1992). Assessing the value of future landscapes. *Landscape and urban Planning* 23: 17-32.