The Total Economic Value of wetlands in a European Region

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Abstract

The Contingent Valuation Method was used to elicit willingness to pay an annual tax to preserve the Region of Veneto (Italy) wetlands. The Total Economic Value of the regional wetlands was evaluated by means of a survey. The respondents were representative of the regional population in terms of spatial proximity to wetlands, socio-cultural membership, rural/urban distribution, and demographic and socio-economic characteristics. The mean value obtained was 62.12 €/year/family. The analysis of the social awareness of the multiple wetland functions was performed using a multivariate logit model, which suggested a clear perception of some functions (recreation and habitat), and a weak perception of other "environmental based" functions (water quality improvement, flood protection, etc.). The Total Economic Value was statistically explained by several expected variables for this kind of estimation (income level, study level, membership of interest groups), but not by the variables related to the awareness of the wetlands environmental functions (water reservoir, flood control, yields production, barrier against weather events, depuration). Given the growing role of wetlands in water resource management, a stronger public information-training effort on the multiple wetlands goods and services seems urgent.

Key words: Contingent Valuation; environmental functions; social awareness, water resource management.

I. INTRODUCTION

In the first half of the 20th century wetlands were perceived by several social groups as noxious areas opposing economic development and landscape exploitation (Boyer and Polasky, 2004). These beliefs brought about the destruction of a great part of these ecosystems, but in recent decades this perception dramatically changed. The Ramsar Convention on wetlands (1971) was an example of this change, mostly linked to new scientific awareness of the wetlands ecological role in terms of water

cycles or biodiversity regulation, highlighting the wetlands importance from the economic, recreational, cultural and scientific point of view.

One of the recognized wetlands functions for the sustainable management of water resources is the surface water quality improvement from several pollutants, comparable to traditional wastewater treatment (Breaux and Day, 1994; Wood, 1995; Kadlec and Knight, 1996; Boustany et al., 1997; Mitsh and Gosselink, 2000; Zhang et al., 2000; Day et al., 2003). Despite this awareness the number of wetlands is still diminishing, because the wetland functions are not generally associated with some recognizable monetary values. Yet, as ecological systems, wetlands perform multiple functions that produce multiple benefits. Following the global scale ranking of Costanza et al. (1997), the multiple functions performed by wetlands could be: control of water cycles, including human water supply needs; control of water quality, including the sequestration of noxious compounds and elements; control of the water budget at the watershed scale; control of atmospheric gases exchange; control of disturbance regimes, including floods and extreme weather events; habitat-refuge functions for resident or migratory wildlife; food supply (fish, game, fruits, spices); renewable prime matter supply; recreational provision for the resident and non-resident population; and production of socio-cultural values and goods.

The value of the preservation of these functions ("externalities") is easy to deduce in general terms, but difficult to quantify in monetary terms within a decision making process. The translation of these values into economic terms could therefore facilitate decision making processes. For these reasons the economic valuation of environmental resources is a more and more common practice, meant as the monetary quantification of the benefits (or costs) resulting from the preservation (or the destruction) of an environmental resource ,

The aim of the present paper was to evaluate the Total Economic Value (Turner at al. 2000) of a wetland in a European Region, namely Regione del Veneto, Italy. The Total Economic Value was estimated using the Contingent Valuation Method to elicit the willingness to pay a tax to preserve the wetland of the Veneto Region.

The work was part of wider research about the role of wetlands (and particularly restored wetlands) in water cycle management. The core of the research field was an experimental constructed wetland located near Chioggia (Venice, Italy) inserire figura?.

II. MATERIAL AND METHODS

II.1 The restored reference wetland

The experimental constructed wetland "Canale Nuovissimo Ramo Abbandonato" was made on behalf of the Magistrato alle Acque di Venezia (Italian Ministry of Infrastructure), through its concessionary Consorzio Venezia Nuova. The project belongs to the interventions for the preservation of Venice and its Lagoon.

Inlet water came from a drainage sub basin characterized by agricultural (80%) and urban-industrial land use (20%). The 21 ha wetland was created modifying the morphology of an abandoned channel on the Lagoon border, and restoring three different wet ecosystems.

II.2 The Total Economic Value

The Total Economic Value (TEV) of wetlands is defined as the total amount of resources that individuals would be willing to forego for an increased amount of wetland services (Turner at al. 2000). The economic value of wetlands includes both use and non-use values. Use values involve some human "interaction" with the resource and may be derived from outputs that can be consumed directly (e.g. water supply, recreation). Non-use values are derived from the knowledge that a resource is maintained (Lambert 2003; Turner et al., 2003; Ramachandra and Rajinikanth, 2004).

A widespread method to obtain the TEV is the Contingent Valuation Method (CVM) (Mitchell and Carson, 1989; Arrow et al., 1993; Carson et al. 2001; Fukahory and Kubota, 2003; Meyerhoff and Liebe, 2006; Alberini and Chiabai, 2007). The contingent valuation method elicits the willingness to pay or the willingness to accept (a fee) for a good/service,. By means of a survey, respondents may be asked to state they willingness to pay for natural resource protection or for related goods and services.

This method has become one of the most widely used non-market valuation techniques, due to its flexibility and ability to estimate TEV, including non-use value (Carson et al., 2001). The validity of such surveys depends on numerous factors related to survey design and execution, as well as success in avoiding response and other biases.

II.3 Survey design

An in-person open-ended (Mitchel and Carson, 1989) pre-test was undertaken on a respondents sub-sample (12% of the 421 interviewed), to verify and test the questionnaire robustness, and to identify likely bids to be used in the full survey (Arrow et al., 1993).

The survey questionnaire had a closed-end format, which is likely to provide the most reliable valuations (Arrow et al., 1993). The NOAA Panel on Contingent Valuation contains a number of recommendations about the design and implementation of CV surveys, among other things, the Panel suggests the use of a referendum CV question (Arrow et al., 1993).

The questionnaire was designed to reduce:

- The bias of a non-credible hypothetical contingent market. The payment mechanism must be credible to respondents: they should believe that they really could have to pay for the good. (Arrow et al., 1993; Carson et al., 2001).
- Biased answers, giving context elements and information to allow the respondent to verify their comprehension and acceptance of the proposed scenario. As suggest from many studies a good practice is to remind succinctly the possible reasons for voting in favor or against the hypothetical public program before asking the referendum question (Arrow et al., 1993; Mullarkey and Bishop, 1999; Carson et al., 2001; Alberini et al., 2005). For this scope some questions about the awareness of wetland functions were posed before the referendum question.
- Strategic bias that arise when the respondent provides a biased answer in order to influence a particular outcome, and which normally represents 15-30% of the

sample (Halstead et al., 1992; Jakobsson and Dragun, 2001; Meyerhoff and Liebe, 2006). The usual way to differentiate between a true zero WTP and a protest response is to present those respondents who are unwilling to pay with a set of debriefing questions. Based on the answers it should be possible to decide whether a zero WTP corresponds to the economic concept of value or whether respondents are protesting against the valuation scenario (Mitchell e Carson, 1989; Jakobsson et al., 2001; Strazzera et al., 2003; Buchli, 2004; Meyrhoff and Liebe 2006).

The questionnaire was organized in four sections:

- The first section was aimed to introduce the respondent to the issue:

"This survey is part of a wider research project on the wetland of Veneto. Wetlands are low depth water areas like lagoons, deltas, marshes, ponds, etc."

- The second section aims to contribute, in a non-explicit way, to giving more context information about wetland functions and, at the same time, to elicit the respondent's awareness of the multiple functions performed by the wetlands (Costanza et al. 1997).

"Express your opinion about these statements:

Wetlands are the habitat of several plants and animals (fishes, shellfish, water birds, mammals, reptilians);

Wetlands yield several categories of economic goods (wood, cane, fish, game, etc.);

Wetlands have a water purifying function;

Wetlands are important as water reservoirs;

Wetlands act as a barrier against wind, waves, and erosion;

Wetlands reduce flood risks;

Wetlands have a recreational function (visits, wildlife watching, and game)"

In the pre-test the answers had to be scored on a scale of 1 to 10 (1: total disagreement; 10: total agreement); on the basis of the results (see Results), and in order to limit the influence of the interviewer's information on the rating, the survey respondent was asked to indicate total agreement, total disagreement, partial agreement or don't know to each of the questions, without giving any more information on the functions reported.

- The third section was designed to create a hypothetical yet credible market, and a robust bid.

To avoid problems relating to hypothetical, and delayed payment, and the distorting effect of the proposed bids (Carson et al., 2001), the pre-test and the full survey were made by simulating an opinion poll for the abrogation of a hypothetical law (Arrow et al., 1993) on wetland preservation which provided a certain reduced fee for the taxpayer. In this way the contingent market would be perceived in a clear way: voting yes, the wetland preservation will decrease, and the family tax too, and vice versa. The question asked was:

"The Region of Veneto approved a law to preserve Regional wetlands. The preservation is funded by an annual tax of 75 Euros per family. A referendum has been proposed to abrogate this law. If the referendum is approved, you could vote:

Yes: you would pay fewer taxes but you should also renounce the preservation actions

No: you would contribute to the preservation of the Region wetlands paying the indicated tax"

To guarantee a robust bid in the pre-test we compared several Regional annual taxes (game taxes 55 - 84 € / year; sport fishing 43.64 for A class license; regional University tax 61.67 – 103.29 € / year). Since the regional taxes interest only those who want to use a certain service, the National television fee (99.60 € / year), which should interest respondents generally (Presidenza della Repubblica, 1991; Regione Veneto, 1993; Regione Veneto, 1995; Presidenza della Repubblica, 2005; RAI, 2006) was also considered. The first simulated fee to be abrogated was set at 75 Euros per year per family.

Moreover, the respondents were asked by how much they would be prepared to have the tax changed. In the closed-end test format the respondents who answered "yes" to the abrogation were asked to express their willingness to pay a lower tax, choosing from a set of proposed values (0, 5, 10, 15, 20, 25, 30, 35, 40, 50, 60 €). The respondents who answered "no" were asked to express their willingness to pay for a higher value, choosing from a set of proposed values (75, 80, 90, 100, 120, 130, 140, 150, 160, 170, 180, 190, 200, 250€). In this test a filter question was added to enable detection if "0 bids" actually corresponded to null economic values, and asking for the motivation of these answers.

- The fourth section aimed to obtain a picture of the sample of respondents (Table 1).

To avoid biases in sample composition, and sample selection (Mitchell and Carson, 1989; Dillman, 1991) we compared the demography of the sample with the regional demography, and we used the in-person interview techniques. In-person interviews by a single interviewer (Arrow et al., 1993) were preferred even in the pre-test, as well as in the full survey, because of their greater accuracy and reliability and lower distortion (Moser e Duming, 1986; Dillman, 1991; Tolley and Fabian, 1998).

We did not undertake any sample re-weighting techniques to adjust sample composition or selection bias, on the basis that the under-represented classes could be those difficult to involve for reasons of indifference or distrust, and also considering that indifference often generates strategic bias (Dixie Watts et al., 1999; Oguz 2000, Grahn and Stigsdotter, 2003; Balram and Dragićević, 2005; Jim and Chen, 2006). During the in-person interviews we underlined the scientific aim of the poll in order to assuage the distrust of the respondents.

To obtain a heterogeneous and statistically representative sample of the community of the region, to be statistically certifiable by means of socio economic, demographic, cultural and/or spatial criteria (urban location, rural location, proximity to urban areas and/or the restored wetlands), the full survey interviews were made in different places (train station, bus station, shops, and streets), to intercept representatives of the whole community, at:

- Venice (October 2005, 202 respondents), representative of the urban context;
- Maerne di Martellago (November 2005, 52 respondents), representative of a rural –urban fringe context (inside the drainage basin of the Venice Lagoon);

- Conche di Codevigo (November 2005, 63 respondents), representative of a rural context close to the Lagoon of Venice and a restored wetland (the experimental one described above).

II.4 Data analyses

The analyses of the 1-10 score questions (pre-test) were made by considering the mean sample value for each question, and then comparing the different classes obtained by means of the stratifying criteria. Parametric or non-parametric ANOVA were performed, according to the validity or not of the parametric assumptions of the sample. We considered results with a p-level < 0.05 as significant.

In the full survey the closed-end format WTP was estimated by means of a dose-response univariate logit model (Hanemann and Kanninen, 1998):

$$P(yes)=1/(1+e^{-\alpha+\beta A}) \quad 1)$$

where P(yes) is the probability of obtaining a positive answerer to pay the bid; α is the constant coefficient if no other independent variables than WTP have been considered; β is the bid coefficient and A is the bid. The curve integration represents the WTP mean value, expressed as:

$$WTP_{mean}=(1/-\beta)*\ln(1+\exp(\alpha)) \quad 2)$$

The median WTP is estimated by mean of

$$WTP_{median}=-\alpha/\beta \quad 3)$$

The algorithm used to obtain α and β was the maximum likelihood method, which estimates the parameters maximizing the probability of obtaining the observed data (Long, 1997).

We used a multivariate logit model to study the relationships among predictors (demographic, socio economic, spatial) and the WTP. To analyze how the selected variables influenced the understanding, or awareness, of the multiple functions performed by the wetlands we used again a logit multivariate model, because the survey format gave discrete variables.

In order to perform the analyses, the variables were transformed in ordinal values (Table 1). Computation was undertaken using STATA software (StataCorp, 2005).

III. RESULTS

III.1 Pre-test

The respondent sample fitted with the regional socio-economic and demographic characteristics (Regione Veneto, 2004).

The mean values assigned to the 7 wetland functions varied from 6.6 and 8.4. The highest value was assigned to the "habitat function" and the lowest values to water quality improvement and barrier functions: 40.4% of respondents voted no to the abrogation of the law on wetland preservation that provides a regional annual tax of 75 Euro. Among the people that would have abrogated the law, 40.4% would have paid a lower tax and the 19.2% would have not paid any tax.

The averaged WTP worked out at 47.8 Euro, with a wide confidence range at the 95% level, over the range 18.1 and 77.5 Euro.

The percentage of "protest bids" of the pre-test was equal to 17% of the sample and fell in the gap 15%-30%, which is typical of these kinds of studies (Halstead et al., 1992; Römer, 1992). The averaged WTP, excluding protest bids, was equal to 59.20 €, with a confidence range at the 95% p level between 39.0 and 79.4 €. In both cases the more frequent value was the one indicated by the simulated law.

The values expressed by the respondents in the pre-test were proposed as bid in the closed end format of the full survey. We also decided to propose values higher than 75€ to those who opposed the abrogation, given the high percent of people willing to pay the amount of tax proposed by the law.

Table 1 Criteria used in the research as predictors of the WTP and of awareness about wetlands goods and services.

Variable / criteria	Categories
Gender	
Income (t € / year)	0-10; 10-20; 20-30; 30-40; 40-50; 50-60; >60
Family size	1; 2-4; <5
Study level	None; lower school; junior high school; high school; bachelor's degree; master's degree; PhD
Activity	(Housewife-student-unemployed); (workman-pensioner); (white collar-manager); (free lance – professional)
Residence	Urban area; rural –urban fringe area; rural area
Age (years)	Young (<30); Adult (30-44); Middle aged (45-64); Senior (>64)
Association	None, other, environment, farmer, hunters
Agreement	Total agreement; total disagreement, don't know
Distance from a restored wetland (km)	0-24;25-44; 45-59; 60-100; >100
Law abrogation	Yes; no
Bid	Yes; no

III.2 Full survey

III.2.1 Sample demographic characteristics

The closed-end format questionnaire was submitted to a sample stratified with the reported criteria (see material and methods). The sample (317 respondents, 52% male, 48% females) had a gender distribution comparable to that registered in the Veneto Region (male = 49%, female = 51%; Regione Veneto, 2004).

The comparison of the sample ages (**Errore. L'origine riferimento non è stata trovata.**) with the regional picture (Regione Veneto, 2003) indicated an under-representation of older people, despite the interviewer effort to involve them. In fact

older people, as in the pre-test, were less available to be interviewed and had no or little interest in the interview issue.

Table 2 Activity and study level classes of the full survey sample: % region = comparison with the regional data (Regione Veneto, 2003; Regione Veneto, 2004).

	Respondents	% sample	% region
Young (<30)	95	29.9	30.2
Adult (30-44)	113	35.6	25.4
Middle aged (45-64)	75	23.7	25.8
Senior (>64)	34	10.7	18.7
Total	317	100.0	100.0
None, lower school	23	7.3	36.4
Junior high school	62	19.6	31.1
High school	146	46	26
Bachelor's degree; Master's degree	86	27.1	6.5
Total	317	100.0	100.0
Family size (=1)	62	19.6	25
Family size (2<n<4)	230	72.5	70
Family size (>4)	25	7.9	5
Total	317	100.0	100.0
Out of job	123	38.8	
Employed	194	61.2	
Total	317	100.0	

The respondents with a lower study level (junior high school and lower school) were the least represented, while the high school group was over-represented (**Errore. L'origine riferimento non è stata trovata.**).

54.3% of respondents lived in the province main towns, 45.7% in other towns. The sample was quite similar to the regional distribution of family size (Regione Veneto, 2004; **Errore. L'origine riferimento non è stata trovata.**). It was made up of workers (61.2%), students (15.6%), pensioners (12.3%), housewives (6.9%) and unemployed (4.1%). The unemployment rate was similar to the 2003 region rate (3.4%, Regione Veneto, 2004).

The economic conditions were related to the declared annual income of the respondents (Table 3). We asked respondents if they belonged to environmentalist, hunters, farmers or other associations: 242 interviewees did not belong to any association (76.3%), 15 belonged to environmental group (4.7%), 7 to farmers (2.2%) and 53 to other associations (16.8%).

Table 3 Income classes of the full survey sample

	Respondents	% Sample
Income range	197	62.2
0-10 000	105	53.2
10 000-20 000	54	27.2
20 000-30 000	24	12.3
30 000-40 000	6	3.2
40 000-50 000	5	2.5
> 60 000	3	1.6
Income not indicated	60	18.9
Do not receive any income	60	18.9
Total	317	100.0

To verify the influence of restored wetland on the respondents' answers we identified their location in relation to the distance from the reference wetland: 72.2% of respondents lived in the range of 22-44 km from the reference wetland, 15.1% lived in a place that was far from the wetland less than 14 km. The others respondents were equally distributed within a range of 100 km.

III.2.2 Wetlands functions

A high percentage of the sample recognized the habitat (91.8% full agreement) and the recreational functions (84.2% full agreement) of the wetlands, with a significant difference between these two functions and the others (Table 4).

Table 4 Results of the ANOVA test of the wetlands functions rate estimations in the full survey sample. Clusters of the significantly different values are indicated.

Wetlands functions	1	2	3
1) Habitat	xxx		
2) Recreational	xxx		
3) Water reservoir		xxx	
5) Economic goods		xxx	
4) Flood control			xxx
7) Barrier (wind, waves, erosion)			xxx
6) Water Quality improvement			xxx

Only 35% of the sample fully agreed with the statement that wetlands have a depurative function and 34% of the respondents could not answer on this point. The

opinions expressed about this function did not differ significantly (Table 4) from those expressed about the flood control function (24% could not answer) and the wind, waves and erosion barrier function (21%). The percentages of respondents who fully disagreed with these three functions were 13%, 15% and 15%, respectively.

Table 5 Results of the Logit multivariate analyses for the wetland function judgments expressed by the full survey sample, considering the following variables to be independent: sex, age, study level, family size, residence, distance form a restored wetland, activity and association. Only the significant relationships are indicated (P<0.1).

	Coef.	Std. Err.	P
Habitat function			
Distance from a restored wetland	0.18	0.11	0.09
Constant	-1.28	5.57	0,06
Water quality improvement function			
Sex	-0.51	0.25	0.04
Study level	-0.35	0.19	0.06
Constant	0,09	0,06	0.05
Water reservoir function			
Age	0.05	0.03	0.05
Constant	0,10	0,09	0.28
Barrier function			
Age	0.03	0.01	0.05
Study level	-0.47	0.28	0.09
Family size	0.22	0.13	0.09
Constant	1.40	1.21	0.25
Flood control function			
Age	0.06	0.01	0.00
Activity	-0.34	0.15	0.02
Residence	0.37	0.18	0.03
Constant	-1.82	1.13	0.10

The agreement with the wetland habitat function statement appeared to be linearly dependent on the distance from the wetland taken as a reference (**Errore. L'origine riferimento non è stata trovata.**). We repeated the analysis on the sample without the respondents living next to the wetland to verify if this outcome was due to a different awareness of those who lived next to wetlands, but the result did not change.

The agreement with the economical goods supply function statement was not predicted by any variable.

The agreement with the purifying function statement was related with gender (slightly lower agreement for women), and with the study level. In this case the agreement, unexpectedly, increased as the study level decreased (**Errore. L'origine riferimento non è stata trovata.**).

Respondent age was the only significant variable for agreement with the water reservoir function statement, with an increasing agreement with increasing age (**Errore. L'origine riferimento non è stata trovata.**).

For the barrier function (against sea storm, wind, erosion) statement, the probability of agreement grew proportionately with age, and moving from urban to rural areas, while it decreased with the study level. The probability of agreement with the flood risk control statement had the same positive relation with age and living location, but it was negatively related to the occupational level (**Errore. L'origine riferimento non è stata trovata.**). The probability of agreement with recreational function statement had no significant predictor.

III.2.3 Willingness to Pay

Of the 317 respondents sampled, 204 (64%) was favorable to the law abrogation. The 47% of these (94 respondents) would have not abrogated the law if they could pay less than the proposed bill (75 €), while the 53% (108 respondents) declared a zero WTP and 1% (2 respondents) did not answer.

99 among the 108 respondents that declared a zero WTP (28.4% of the whole sample) were classified as "protest bids" by means of the debriefing question (Mitchell and Carson, 1989; Hanley et al., 2001; Strazzera et al., 2003; Buchli, 2004; Meyerhoff and Liebe, 2006). This percentage was similar to those normally detected in this kind of research (Halstead et al., 1992; Römer, 1992; Jakobsson and Dragun, 2001; Meyerhoff and Liebe, 2006).

We outlined the “protest bids” sub-sample profile. The gender proportion was the same as the sample, but mainly constituted by middle-aged persons. More than 50% of the respondents were retired, and there were a high percentage of housewives (41%) and workmen (30%). On the contrary students (16%), unemployed (8%) and those who had not declared their income (30%) or declared a minimum one (37%) were under-represented . The high school was the most common study level, but, considering the whole sample, 69% of the lower school level respondents indicated a zero WTP. The sub-sample was located mainly into the belt of 25-45 Km from the wetland used as reference. Considering the whole sample, the highest frequency of “protest bids” belonged to respondents living within 24 Km from the reference wetland. Finally, the most part of respondents lived in rural areas (31.4%); considering the whole sample, the “protest bids” was expressed by the 53% of people living in rural areas.

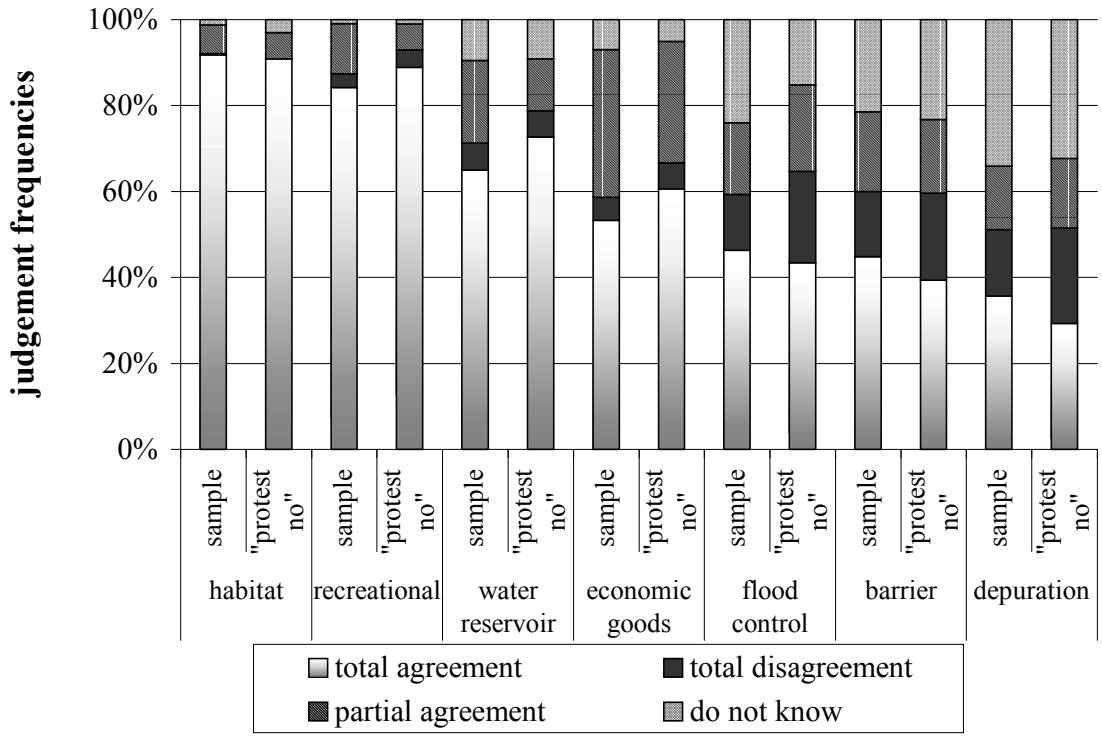
The comparison between the whole sample judgments on the different functions and the judgments expressed by the sub-sample of respondent that assigned a zero WTP values referred to “protest bids” showed no significant differences (**Errore. L'origine riferimento non è stata trovata.**). This result confirmed the hypothesis that these zero values do not correspond to a TEV actually equal to 0.

Two respondents explained the zero WTP with the absence of any income and a minimum pension, and in this case we could suppose that the zero WTP should not necessarily correspond to a zero TEV.

Two respondents justified the zero WTP by their view that those who destroy the wetlands should pay for their preservation. It is interesting to note the analogy with 'the polluter payer principle' which today is a pillar of environmental policies.

The zero WTP due to a lack of interest in the wetlands was considered indicative of a zero TEV (7 respondents). The sample without the "protest bids" and the zero WTP that did not appear to correspond to a true zero TEV, was made of 215 respondents.

Figure 1: Frequency distribution of the judgment expressed about the wetland functions in the full survey sample and in the "protest bids" sub-sample.



We proceeded to estimate the logit univariate model parameters of the whole sample and of the sample without "protest bids". By means of the estimated parameters we obtained the mean and median WTP values. Excluding the "protest bids" increased the mean WTP from 42.25 Euro to 62.12 Euro, and the median WTP from 30.50 Euro to 59.74 Euro. The closeness of the mean and median values in the sample without "protest bids" indicated a good performance for the logistic function. In the sample without "protest bids" the abrogation percentage decreased to 47%, and the non-abrogation percentage increased to 53%.

The evaluation of the effect of the selected explicative variables (Table 1) on abrogation willingness was performed by means of a multivariate logit model (**Errore. L'origine riferimento non è stata trovata.**) on the sample without "protest bids". The probability of an abrogation agreement was higher for women, and decreased with distance from the reference wetland and in respondents belonging to associations.

The same analyses on the WTP showed (Table 6 Results of the Logit multivariate analyses for law abrogation agreements expressed by the full survey sample without "protest bids" considering the variables sex, age, study level, family size, residence, distance form a restored wetland, activity and association as being independent. Only significant relationship are indicated (P< 0.1).

	Coef.	Std. Err.	P
Sex	0.718	0.402	0.074
Distance from a restored wetland	-0.031	0.013	0.014
Associationism	-0.751	0.256	0.003
Constant	0.306	1.390	0.826

Table 7) that the probability of willingness to pay:

- Increased proportionally to the study level, income, association and distance from the restored wetland.
- Decreased moving from urban to rural areas.

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Table 7 Results of the Logit multivariate analyses for the WTP expressed by the full survey sample without "protest bids", considering the variables bid, sex, age, study level, family size, residence, distance form a restored wetland, activity and association. Only significant relationship are indicated (P< 0.1).

	Coef.	Std. Err.	P
bid	-0.046	0.001	0.000
Sex	-0.206	0.101	0.410
Study level	0.057	0.017	0.001
Income	0.283	0.051	0.000

Residence	-0.365	0.059	0.000
Distance from a restored wetland	0.014	0.002	0.000
Associationism	0.711	0.064	0.000
Constant	1.062	0.341	0.002

The last effect could be due to the fact that several urban respondents lived in Venice (inside a lagoon, which is a wetland), and therefore they could have developed a particular sensitivity for this issue. To verify this supposition, a new analysis was performed considering the new category “living in a wetland”, but the results did not differ.

IV. DISCUSSION

The mean WTP for the preservation of the Veneto Region wetlands, excluding the “protest bids”, corresponded to a slightly lower value than the one proposed in the simulated law. This result suggested that the hypothetical contingent market proposals were considered credible by the respondents, as also confirmed by the lack of questions about the law existence. The estimated WTP could be therefore considered a reliable estimate of the wetlands TEV. The full survey estimate was equal to 62.12 €, very close to the mean estimate obtained with the open-end format used in the pre-test (59.20 €).

We considered that environmental functions awareness could be split in two perception/cognition categories (**Errore. L'origine riferimento non è stata trovata.**).

The first category could be represented by functions readily perceived by society, like the possibilities for ‘exploration’ (Kaplan and Kaplan, 1982) (hunting, fishing, recreation, wildlife watching) or for the identification of a specific and characteristic habitat. In the last case the function has a higher value for urban people than for rural people living near a wetland (because of its "wilderness" image: Buijs et al, 2006). The “distance from restored wetland” was actually the only significant predictor to explain the common and strong agreement with this function.

The second category related more to a functional image of landscape and nature (Luginbüil, 2001; IFEN, 2000), and could be represented by the “ecological/environmental functions” (water reservoir, flood control, yields production, barrier against weather events, water quality improvement) that can be tied to a legacy of experience structured on (i) established knowledge and (ii), consciousness induced by handed down shared community know-how.

Considering these two categories, we observed two converging phenomena in the society under study. The first was that the uncertainty of judgment, given by a low level of awareness or extreme positions of denial, progressively increased towards the “ecological/environmental functions” as framed above (**Errore. L'origine riferimento non è stata trovata.**). The second was that the awareness of this kind of functions was generally explained (**Errore. L'origine riferimento non è stata trovata.**) by the respondent’s age (and the related family size), the rural location and (in a weaker way) the male gender - linked to the hydraulic management role in a rural society of old reclaimed landscapes. As a matter of fact, the comparison of the

rural sub-sample vs. the survey sample showed a percentage increase of age and family units in the rural sub-sample (Table 8).

The awareness of ecological/environmental functions is generally related to empirical experiences that are traditionally linked to rural areas near wide, old wet systems, as the Venice Lagoon is. The lack of awareness of these functions could be therefore related to a missed legacy of these experiences. The reasons could be different: (i) legacy was not culturally fixed, as for the “water quality improvement function”, which answers to questions and/or implies current scientific know-how not handed down, until some decades ago, by rural communities; (ii) legacy was abandoned, as for the “economic goods function” (food and biomass) that today is seen by rural communities only in terms of leisure and welfare, and no longer in terms of necessity as in the past.

We observed a distinction between the predictors of the wetlands functions awareness and the predictors of the WTP. In fact, the variables that significantly explained the WTP were those generally expected for these kinds of shared goods, like urban location, study level and income. The membership to interest groups, mostly the environmental ones, also influenced the estimate (Table 6 Results of the Logit multivariate analyses for law abrogation agreements expressed by the full survey sample without “protest bids” considering the variables sex, age, study level, family size, residence, distance form a restored wetland, activity and association as being independent. Only significant relationship are indicated (P< 0.1).

	Coef.	Std. Err.	P
Sex	0.718	0.402	0.074
Distance from a restored wetland	-0.031	0.013	0.014
Associationism	-0.751	0.256	0.003
Constant	0.306	1.390	0.826

Table 7).

None of the variables related to the multiple wetlands functions awareness were significant predictor for the WTP, or when they were they had a negative correlation (e.g. study level, rural location). The variable “study level" was a significant predictor of the proportional probability of willingness to accept the bid (Table 6 Results of the Logit multivariate analyses for law abrogation agreements expressed by the full survey sample without “protest bids” considering the variables sex, age, study level, family size, residence, distance form a restored wetland, activity and association as being independent. Only significant relationship are indicated (P< 0.1).

	Coef.	Std. Err.	P
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Associationism	-0.751	0.256	0.003
Constant	0.306	1.390	0.826

Table 7), but a higher study level was unexpectedly linked to a lower awareness of wetlands environmental functions (**Errore. L'origine riferimento non è stata trovata.**). In the same way, the rural location was related to a higher awareness of environmental function and to a lower WTP..

Table 8 comparisons of the rural sub-sample and full survey sample groups.

	Rural sub-sample	**Full survey sample**		
	N° respondents	% respondents	N° respondents	% respondents
Young (<30)	28	20.9	95	29.9
Adult (30-44)	50	37.3	113	35.6
Middle aged (45-64)	34	25.4	75	23.7
Senior (>64)	22	16.4	34	10.7
Total	134	100.0	317	100.0
None, lower school	18	13.5	23	7.3
Junior high school	34	25.6	62	19.6
High school	51	38.3	146	46.0
Bachelor's degree; Master's degree	30	22.6	86	27.1
Total	133	100.0	317	100.0
Family size (=1)	16	11.9	62	19.6
Family size (2<n<4)	106	79.1	230	72.5
Family size (>4)	12	9.0	25	7.9
Total	134	100.0	317	100.0
Out of job	28	20.9	194	61.2
Employed	106	79.1	123	38.8
Total	134	100.0	317	100.0
White collar-manager	35	33.0	67	34.5
Free lance – professional	18	17.0	72	37.1
Workman-pensioner	53	50.0	55	28.4
Total	106	100.0	194	100.0

Together with the "rural location", the "distance from a restored wetland" also positively influenced the WTP (Table 6 Results of the Logit multivariate analyses for law abrogation agreements expressed by the full survey sample without "protest bids" considering the variables sex, age, study level, family size, residence, distance form a

restored wetland, activity and association as being independent. Only significant relationship are indicated (P< 0.1).

	Coef.	Std. Err.	P
Sex	0.718	0.402	0.074
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Associationism	-0.751	0.256	0.003
Constant	0.306	1.390	0.826

Table 7). This could suggest a lower sensitivity of rural people spatially concerned with wetland restoration.

This rural population stratum accounted for 26% of protest bids and for 27% of zero WTP, and was characterized by a high percentage of low study level persons, pensioners, workmen and low incomes category, all variables generally associated with low WTP (Dixie Watts et al., 1999; Oguz 2000, Grahn and Stigsdotter, 2003; Balram and Dragićević, 2005; Jim and Chen, 2006). The low WTP assigned by the rural people living near a wetland could be therefore due to the socio-economic and demographic characteristics of this population, rather than the “distance from restored wetland” per se. We also verified that there were no significant differences among socio- economic and demographic profiles and the WTP of the “rural” and the “rural near to restored wetland” sub-samples. We could therefore assume that the decreasing WTP detected while moving from urban to rural areas was basically due to the socio-economic and demographic characteristics of the rural population, and not to any lack of perception of wetlands functions.

Differently from these results, a study on rural shared social goods (hedgerow networks) in the same area demonstrated that the higher awareness of rural people about hedgerows multiple environmental functions corresponded to a higher mean WTP (Franco et al., 2001; Mannino et al., 2001). This disagreement could be explained by the historical perception of hedgerows and wetlands. The understanding of hedgerows environmental properties, historically and culturally valued by farmers, counterbalanced the socio-economic characteristics of rural population, unfavorable to a high WTP as described above.

Differently from hedgerows, wetlands were perceived to play a contradictory role in rural areas. On the one hand, in the Veneto region wet areas historically had water management and protective roles, institutionally administrated by government agencies and not by farmers (the Venice Republic maintained the Lagoon of Venice since the XIII century, ensuring its existence). On the other hand, wetlands were reclaimed for agricultural or malaria control purposes, and where the wetland represented the only exploitable component of the environment, life conditions were very marginal. In the course of time wetlands could have therefore produced: 1) the awareness about environmental roles managed by the whole community, but without any direct benefit to rural farmers, 2) the perception of a place to be reclaimed, or where it was hardly suitable to live. We could suppose that, although some wetlands functions were more clearly perceived by rural people, there could be a lack of shared

tradition of the farmer's benefit and/or any clear sense of belonging of these ‘goods’ to the rural landscape, as in the case of hedgerows.

V. CONCLUSIONS

The study estimated the Total Economic Value of the wetlands of a European Region (Veneto, Italy) by means of the Contingent Valuation Method, eliciting it from a survey on a fully representative sample of the Regional community, from the socio-economic and demographic point of view.

The analysis of the awareness of the multiple wetlands functions, performed by means of a multivariate logit model, showed that: (i) for certain functions there was a unanimous awareness, yet only slightly related to the selected explicative variables; (ii) for other functions the understanding was less shared but linked to explicative variables.

The unanimous recognized functions were those immediately perceived by society. They related to leisure and/or to the habitat specificity, or to the preservation of the shared resource water and/or to the generic production of economic goods (fish, game, and biomass). In the last two cases the percentage of those that intuitively agreed without having any specific confirming elements grew.

Instead the less perceived functions were not related to a common ethic or evocative idea. In fact, they derived from specific learning (water quality improvement) and from legacies of empirical experiences shared among rural communities nearby wide wet areas (flood and extreme weather events protection). A specific case was the "economic goods function" (production of food and biomass) that was not more perceived, by the rural community nearby the Lagoon of Venice, as expected.

The hypothetical contingent market, created to estimate TEV, was robust: nobody questioned about the existence of the law and there was a good statistical fit between the full survey sample and the Region society for territorial, socio-economic, and demographic distribution. We obtained a reliable approximation of the regional wetlands TEV equal to 62.12 €/year/family.

The WTP was statistically explained by several variables that were expected for this kind of estimation (income, study level, membership to interest groups), but not by the same variables related to the awareness of the wetlands "environmental" services (mainly age, living location, and study level). The rural society stratum corresponded to a high awareness but to a low mean WTP.

We could suppose that, although environmental wetlands functions were more clearly perceived by rural people, there was a lack of shared tradition of the farmer's benefit and/or a low recognition of these ecosystems as belonging to the rural landscape.

Finally, it seems important to underline that, even if the wetlands corresponded to a high TEV in this region, the awareness of their role in the water quality improvement had no influence on the TEV. This wetland function today is a prevailing factor for the preservation and restoration of wetlands, in terms of landscape sustainable resource management. Considering the wetlands role in present day society, and in the EU and Regional policies, it is an urgent issue to back up this lack of understanding with a coherent public information and educational campaign.

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