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Abstract
This research advances the understanding of people's attitude towards water resources valuation. Specifically, it aims to improve confidence in the interpretation of people's willingness to pay (WTP) for water resources protection by enhancing understanding of value relationships. Primary data were obtained from a sample of 510 people living in and visiting the Pinios River in the eastern part of Central Greece. Respondents' behavior was explored by measuring and comparing use and non-use values with the help of a proposed constructed scale for measuring the dimensions of Total Economic Value of a water resource. For this purpose, a combination of applied methodological research techniques like Principal Component and Cluster Analyses together with logistic regression was used. The results indicated the relative importance of particular value components in determining water resources conservation preferences, as well as individuals' WTP for protecting them. We have extracted four factors and explored their influence on respondents' WTP and the general attitude towards the area. There were high associations between WTP of individuals towards river protection in relation to their characteristics (like education, income and origin).

Keywords: River; Contingent Valuation; WTP; Total Economic Value.

JEL Classifications: Q51; Q57; Q25; Q28; C80; D12.

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Introduction

Last decades there has been an increasing concern about the valuation of ecosystem services because of the potential importance such values may have in influencing effective public environmental policies. The economic valuation of water resources offers all needed information on the value of water availability, quality and application in alternative uses helping in decision making (Saliba *et al*., 1987; Colby, 1989) and providing an estimation about the costs and benefits of any development projects (de Groot *et al*., 2006; Turner *et al*., 2000; Barbier *et al*., 1997).

In addition, values of ecosystem services may provide a link between human behavior and decisions making for natural systems (Howarth and Farber, 2002) while this link had not yet been determined (Ajzen and Fishbein, 1977; Axelrod, 1994). A large body of research has built up on the issue of what explains human values towards natural areas. Most of them focus on individual environmental values while an increasing number of studies focus on stated willingness to pay (hereafter WTP) for protecting the environment (Dietz *et al.,* 2005).

Rivers play an important multi-dimensional role on human well being. They can provide many services to humans, including, among others, water supply for municipal, industrial and agricultural users, fish habitat and recreation. Some of them are competitive because of private use, in some cases, of river basin. Perhaps the most important issues in water resources management is their economic valuation because of the potential importance may have in influencing public opinion and policy decisions (Loomis *et al*., 2000).

For exploring the attribute of economic values to river, a sample consisting of different groups of people (visitors and residents) was collected. The contribution of this paper to the literature is twofold. First, it adds to the understanding of the relationship between individuals' general concern for environmental use and conservation. For this task a constructed scale is proposed to measure different environmental values. Secondly, it contributes to the increasing number of economic valuation studies which investigate the economic value of conservation and improvement of water resources quality in general.

More specifically, our current work aims to contribute to research by explaining the links between water resources held values, human beliefs, norms and environmental behavior by providing a way for valuing changes in water resources quantity and quality. Specifically there are specific objectives: first, to develop a model for identifying the range of held values across different groups of people for a natural area's future and investigate the components of total economic values of a wetland ecosystem. Second, to identify some of the factors (or variables) shaping individuals' values for natural areas. And finally to reflect the way in which people's socioeconomic and environmental characteristics intervene with individuals' preferences for environmental protection and future management.

The structure of the paper is the following. Section 2 provides the background information of the existing relative literature while section 3 discusses the study area and explains the survey design statistical methods proposed to tackle the problem. Section 4 presents the empirical results obtained together with the analysis used to measure different public perceptions of total economic value. This section ends by discussing the meaning of these results in relation to the existing relative literature. The last section concludes the paper raising a number of policy implications associated with the extracted results and discusses future research directions.

2. Background

While the importance of environmental quality has been certified measuring its economic value has been proved a difficult task for economists (Steinnes, 1992). The water quality is assigned as suitability for providing recreational activities and for supporting wildlife and plant populations (Del Saz-Salazar *et al*., 2009). The decisions on how to manage water quality could be based on benefits (private, social or ecological) that could arise (Johnson *et al.,* 2008). On the other hand the costs involved in the improvement of water quality arises quandary if some alternative use of the money would be more beneficial.

A water quality improvement in surface waters generates a wide variety of economic and social benefits (market and non market). Some of them are not related with the actual use of water resources and are known as non-use values which correspond to a wide range of motivations for people to value environmental improvements in water resources despite their use.

A number of studies tried to explain behaviors and attitudes against management strategies from different groups of people (like farmers, wildlife managers and biologists, loggers and environmentalists) in relation with values that hold to natural environment (Kempton *et al.,* 1995; Steel *et al.,* 1994; Bjerke and Kalternborn, 1999).

A solution to the problem of environmental quality degradation is based on human values towards natural environment, because of the theory that values influences people's behavior (Rokeach, 1979). The link between human behavior (beliefs, attitudes, social concepts and motivated actions) and decision making for natural systems was the subject and was empirically described in a number of studies related to natural resources management (Manning *et al.,* 1998; Schultz and Zelezny, 1999; Schwartz, 1994; Stern and Dietz, 1994; Stern *et al.,* 1999; Vaske and Donnelly, 1999). On the other hand, a number of studies tried to describe and explain the different behavior between different groups of people (like farmers, wildlife managers, biologists, loggers and environmentalists) for supporting management strategies (Kempton *et al.,* 1995; Steel *et al.,* 1994; Bjerke and Kalternborn, 1999).

People hold values to environment based on their relationship with emotional acting by pure anthropocentric to pure biocentric and ecocentric motives (Dunlap and Van Liere, 1978; Stern *et al.,* 1993; Axelrod 1994; Steel *et al.,* 1994; Kempton *et al.,* 1995; Bjerke and Kalternborn, 1999; Edwards-Jones *et al.,* 2000; Lück, 2003). Anthropocentric motives lead to the environment's instrumental value (the most common and easily understood value), while biocentric and ecocentric philosophies attribute intrinsic values to the environment.

In the existing literature, when trying to explain why individuals place values on a natural resource, a typical approach is to distinguish between those who use the resource and those who do not (Freeman, 1993). As a result, total economic value is not only use value, but the sum of both use and non-use values. The Total Economic Value (hereafter TEV) framework in the context of water resources is divided into six categories: Direct

Use Value, Existence Value, Indirect Use Value, Option Value, Bequest Value and Quasi Option Value (Pearce and Turner, 1990; Spurgeon, 1992; Hanley and Spash, 1993; Pearce and Moran, 1994; Bateman and Langford, 1997; Barbier *et al.*, 1997; Nunes *et al.*, 2000; Halkos 2013).

Moreover there is a strong relation between people's WTP and environmental improvement. The economic benefit of water quality improvements is society's WTP for increases in water quality. The Contingent Valuation Method (CVM) is the best known and most widely applied stated preference technique for measuring the TEV (Mitchell and Carson, 1989; Arrow *et al.,* 1993; Carson *et al.,* 2001; Alberini *et al*., 2005). According to Mitchell and Carson (1989) CVM uses hypothetical survey questions to what people are willing to pay for specified improvements of public goods.

However, in the last decade, the method has been increasingly applied for valuation of river quality and for measuring WTP for its provided services such as increases to ecosystem services (Boyle *et al.,* 1985; Loomis *et al.,* 2000; Paulrud and Laitila, 2004; Ojeda *et al.,* 2008; Barton and Taron, 2010; Kataria, 2009; Birol and Das, 2010; Wang *et al,*. 2010), water quality (Desvousges *et al*., 1983; Desvousges and Smith, 1987; Mitchell and Carson, 1989; Bockstael *et al.,* 1989; Green and Tunstall, 1991; Andrews, 2001; Bateman *et al.,* 2006; Imandoust and Gadam, 2007; Hitzhusen, 2008), recreational benefits (Daubert and Young, 1981; Brookshire and Smith, 1987; Green and Tunstall, 1991; Sanders *et al.,* 1990; Sanders *et al.*, 1991; Duffield *et al.*, 1992; Weber and Berrens, 2006), enhancing flow (Willis and Garrod, 1999; Garrod *et al,*. 1996; Douglas and Taylor, 1998; Ojeda *et al.,* 2008) and restoration of river's ecosystem

(Zhongmin *et al.,* 2003; Collins *et al.,* 2005; Weber and Steward, 2009; Bliem and Getzner, 2012).

In Greece, to our knowledge, there is no other study exploring the motives behind people's behavior towards river values.

3. Materials and methods

3.1. Study area

Pinios river is the third longest river in Greece and rises in the Pindos mountains in central Greece. The main economic activities are agriculture, tourism, livestock and fisheries. Agricultural activity uses most of the water supply and is the main cause of significant water quantity and quality problems. Abstractions are undertaken in order to satisfy the following uses: drinking water, irrigation water, water for industrial processes and water for power generation. Pressures in the surface, coastal and ground waters on Pinios river basin are caused from over-exploitation of groundwater during the summer irrigation period, water abstraction for irrigation purposes, pollution, channels for flood protection and tourist infrastructure in the coastal area.

3.2. Survey design

A contingent valuation survey was carried out to a sample of n=510 randomly selected people, consisted from users of Pinios river. Face-to-face interviews were conducted on-site. Usually a CVM survey uses questions to elicit a person's WTP for a change in supply of environmental goods. In this case, we were looking at changes in the quality of Pinios' river natural environment.

For this reason a questionnaire was constructed and tested according to guidelines established by the NOAA panel (Arrow *et al.*, 1993). A hypothetical market was developed in which an individual reveals his/her WTP for protection of Pinios' river environment. The structure of the hypothetical market involved three elements:

(1) Description of Pinios River and the related hypothetical scenario;

(2) The form and frequency of payment and

(3) The WTP question format which was a voter referendum to approve this effort. Respondents were asked, prior to the WTP question, whether they would support a river's improvement program. Implementation of the program would cost them a specified amount of money (in €) in a one-time payment.

In the second phase, the WTP was elicited only from people who had answered positively to the first question. This time respondents were asked if they were willing to pay a specific amount of money to confirm their participation. Specified amounts were randomly assigned to respondents. In the questionnaire of the pilot study an open-ended question format was included with the aim to specify the bit step amounts of the final questionnaire due to lack of previous valuation studies for the study area. The results of the pilot study show that the WTP amounts were fluctuated between 1 € and 50 €. Thus, bit step amounts were used based on the results obtained in the pretest and in the pilot study and ranged from 1 € to 61 € (bit step 3 €).

Given this information, respondents were asked whether they would vote "yes" or "no" to approve this effort. Follow-up questions were asked to determine reasons for respondents' answers. As protest responses were considered those rejecting some feature of the hypothetical contingent valuation (CV) scenario.

4. Empirical results and discussion

Table 1 presents the descriptive statistics of the respondents' socioeconomic characteristics while Table 2 displays analytically the reasons for not paying.

Table 1: Descriptive statistics of respondents' basic socioeconomic characteristics

	Number of observations	Mean	Standard Deviation
Nativity (%)	510	51.76 (Residents)	
Gender (%)	507	50.3% (Female)	
Age (years)	499	34.35	12.64
Education level (years)	495	14.4	2.9
Mean Monthly income (€)	365	1178.2	601.3
Marital Status (%)	496	46.7 (Single)	

Table 2: Reasons for not paying in percentages (number of respondents in parentheses)

I cannot afford it	27.22% (49)
Lack of confidence	9.44% (17)
Natural Environment protection is state responsibility	28.9% (52)
Environment is a public good	27.22% (49)
We pay through taxation	2.22% (4)
I'm not interested	5.0% (9)

4.1 Principal Components Analysis

Next, Principal Components Analysis (PCA) was used as a tool for measuring different public perceptions with regard to economic dimensions of the Total Economic Value (TEV) of a river. Specifically, for this reason respondents were asked to indicate on a five-point Likert scale for each topic their opinion for the importance of 47 reasons holding economic value to Pinios river. Reliability analysis of the question revealed that Cronbach-*a* was 0.962. The PCA has extracted four factors explaining 59.94 % of the fluctuation of the total variance. The Kaiser-Meyer-Olkin (KMO) criterion for sampling adequacy was equal to 0.925 and the Bartlett's test of sphericity was equal to 17818.204 (with a P-value of 0.000).

The results of PCA indicate that the respondents were able to clearly distinguish between the majorities of the established in the literature types of environmental values from the set of items provided.

In this way, the first environmental value - factor that was identified by the respondents represented «*Option and direct use values*». This was the most important factor explaining 37.25% of the total variance in the data. The reliability analysis showed that the Cronbach's-α coefficient was 0.944, which indicates substantial reliability of the factor**.** Items load in the first factor are subjects related to elements that have to do with future fish and biomass production, the use of the lake for recreational reasons and the possibility of watching the flora and fauna of the area in the future. Option value is derived from the knowledge that a resource is available for their use in the future and is related with its preservation for a potential future direct and indirect use (e.g., native plant biodiversity as future source of medicines).

On the other hand, direct use values refer to the economic dimension of a water resource and indicate people's WTP for benefits provided by the wetland or the level of compensation they would expect for the loss of those benefits. According to Pearce and Moran (1994) a direct use value is derived from the direct personal use of the environment and is associated with benefits derived from fish, agriculture, fuel wood, recreation, transport, wildlife harvesting, peat/energy, vegetable oils, dyes, fruits, etc.

The results are in line with the opinion that option value is a component of use value and must be classified in this category of environmental values **(**Randall and Stoll, 1983; Kolstad, 2000; Weikard, 2005). There is a debate associated with the definition and concept of option value (Hanemann, 1989; Walsh *et al.*, 1984). Freeman (2003) claimed that option value does not exist and so the new guidelines for environmental economic assessment do not mention them**.** However the results of our current study show that it is a very important dimension of total economic value of a river for people. Alternatively, there is a great possibility that people in this way express their desire (or wish) for future use of the river. Today the river suffers pollution from agricultural and urban runoff and such uses are not currently planned and thus safeguard the option to use a natural resource in the future otherwise it becomes unavailable (Spurgeon, 1992).

The second factor which was identified by the participants in the research was named "bequest value". This factor explains 12.12% of the total variance in the data. The Cronbach's-α for this factor was 0.904. The motives that explain this factor consist of the area maintenance for development of recreational activities (fishing as recreational activity) by future generations, the future production of the river, energy production etc. Bequest value is a component of non-use values (Krutilla, 1967; Brookshire *et al.*, 1983; Cicchetti and Wilde, 1992) and refers to the value an individual places on ensuring the availability of the benefit to future generations like, for instance, preservation for future generations, including spiritual and cultural values (James and Gillespie, 1997). The results are almost expected as bequest values may be particularly high among the local populations which use a wetland and they want their today way of life and the wetland to be inherited by future generations (Barbier *et al.*, 1997). Bequest values may include option, existence and vicarious use values for future generations, for instance potential pharmaceutical benefits.

The third factor that was identified in our research was named "existence value". The category of existence value was created as it was recognized that there was something missing from standard cost-benefit calculations. The low percentage (6.37%) of this factor's variance shows that it plays a secondary role in respondent's decision to pay for the river. Reliability analysis of third factor revealed that Cronbach-*a* was 0.921. The identification of existence value shows the importance of the river (ecological, etc). Existence value is one of the most important non-use values and it is the value that people place because of simply knowing that certain things exist (including also ethical concerns), for example, rare species or special ecosystems even if it is never experienced or intend to see or use it in the future.

Pearce and Turner (1990) point out that existence value stems from different forms of altruism while Turner (1999) claims that existence value is a special form of altruism. For some environmental economists, existence value does not only derive from altruism but sometimes stems from the knowledge about resource existence related to other uses (Kolstad, 2000), and environmental responsibility (Bishop and Welsh, 1992). Randall (1986) points out that existence value has traditionally been associated with unique natural phenomena threatened with irreversible damage. Thus, sometimes existence value is often realized in the form of donations.

Aldred (1994) claimed that intrinsic value may be a component (or motive) of existence value but never the same type of environmental value. Existence value is an important element of the value people hold to natural environment or to its functions and consists of people's satisfaction (spiritual, esthetic, or cultural) from nature's diversity, beauty, complexity, or power (Goulder and Kennedy, 2010). According to the results, there are numerous motives, like sympathy for wild animals and plants, the use of the river by next generations, recognition of existence rights towards the non human items and willingness of people to take part in an environmental management project.

Rosentahal and Nelson (1992) point out that the existence value should not be used in cost-benefit analysis and noting their semantic weakness claim that all beings have this value. Cummings *et al.* (1995) in reviewing a number of researches measuring the non-use value of the environment claim that the existence and the bequest values do not have any functional significance. On the other hand, there is a considerable debate upon whether current economic procedures can accurately measure non-use values and, more fundamentally, whether these values exist and have an important role in decision making. The results of the present study confirm that people are willing to pay for wetland simply because they appreciate the fact that wetlands or their services exist.

Finally, the last factor identified in our research was called "indirect use value". Indirect use value is a component of use value and is derived from the wetlands functions like nutrient retention, flood control, storm protection, groundwater recharge, external ecosystem support, micro-climatic stabilization, shoreline stabilization, etc (Champ *et al.*, 2003). The reduction of environmental quality results to a reduction in humans' welfare (Toman, 1997; Costanza *et al.*, 1997). Indirect use values, also known as functional values, can be described as the benefits indirectly enjoyed by people as a result of the primary ecological function of a given resource.

The correlations between the factors are significant and reflect theoretical expectations (Table 3). The high correlations between the extracted factors and the total factor (FTOT) show that there are no reasons for future isolation of some items from the factors that interpret the TEV of Pinios river. Moreover, the high correlation between the first and the second factor is predictable as bequest value is related to future use of next generations.

Table 3. Correlations between PCA factors

	Option and direct use values	Bequest Values	Existence value	Indirect use value	FTOT
Option and direct use values	1	.669(***)	.460(***)	.440(***)	.868(***)
Bequest Values	.669(***)	1	.519(***)	.587(***)	.856(***)
Existence value	.460(***)	.519(***)	1	.645(***)	.739(***)
Indirect use value	.440(***)	.587(***)	.645(***)	1	.758(***)
FTOT	.868(***)	.856(***)	.739(***)	.758(***)	1

*** Correlation is significant at the 0.01 level (2-tailed).

According to the literature these two samples of visitors and local residents are expected to have distinctive preferences for environmental settings (Regenberger, 1998; Vail and Heldt, 2004; Soguel *et al.*, 2008). Table 4 presents a Mann-Whitney *U* test conducted to evaluate the hypothesis that resident respondents would score higher values related to reasons of river's preservation compared to visitors. Our null hypothesis is that the distribution of each factor is the same across nativity (that is residents and visitors). Looking at these results, and with the exception of the bequest values, residents and visitors have different behavior against the dimensions of the river's economic value and the former have a more instrumental relation with the river.

Table 4: Results of the nonparametric Mann-Whitney test

	Residents/Visitors	P	Decision
Option and direct use values	Residents	.041	Reject
	Visitors		
Bequest Values	Residents	.149	Do not reject
	Visitors		
Existence value	Residents	.000	Reject
	Visitors		
Indirect use value	Residents	.000	Reject
	Visitors		

4.2 Cluster Analysis

The next step involved a K-means Cluster Analysis. We have used cluster analysis to group the survey respondents according to their preferences and attributes towards environmental values. Cluster analysis was conducted using factor scores extracted from PCA using the proposed scale. According to our empirical results values for natural areas (as water resources) are a useful way to group and describe different populations. In our present study a four-cluster solution was chosen as it provided an acceptable distribution of cases across the clusters and the most interpretable solution. The identification of clusters helps us to understand the way that population and different groups of people value natural areas. Also, identification of clusters based upon common values is a demonstration that each individual may assign different importance to each component of environmental value.

Specifically, the scores of the participants (n=510) were analyzed and a four-cluster solution proved to be the most interpretable one. According to the results all variables used in the cluster analysis have the ability to distinguish participants to different categories. Only the 1st cluster hold positive values for option and direct use values as well as indirect use values while the bequest value was positive in all clusters except the 3rd and the existence value was positive in all clusters but the 2nd.

The first and small cluster of n=23 was characterized by respondents who are mainly married, women, residents, about 33 years old, highly educated, with high income and with non pre-environmental behavior. The first cluster had positive all PCA factors characterized by low bequest value. Members of the first cluster seem to value river ecosystem mainly for direct use values that it provides for now and for the future (option value).

Table 5: Factor scores for values: Comparison between clusters

Cluster	n	Option and direct use values	Bequest Values	Existence value	Indirect use value
1st	23	0.73	0.21	0.48	0.24
2nd	159	-0.06	0.09	-0.16	-0.19
3rd	28	-0.19	-0.39	0.31	-0.04
4th	111	0.04	0.45	0.06	-0.06

Value scores for all pairs of clusters are significantly different except for the 4th
(p = 0.04), (p = 0.00), (p = 0.014), (p = 0.275)

The second segment that emerged was the biggest in size (n=159). It was the only cluster that members are mainly males. The members of the second cluster are also residents of the area, around 42 years old and married with also non pre-environmental behavior and with low income. Members of the second cluster mainly value the area for its use from future generations and for the benefit knowing that it continues to exist. The strong negative value of indirect value shows little desire to area's input to their life (as services provided by river, such as the lower organisms on the aquatic food chain provide indirect use values to recreational anglers who catch the fish that eat them).

The third cluster (n=28) was consisted mainly by residents and had almost the same characteristics with the first cluster with only changes in the marital status and different income levels. The members of this cluster are women, highly educated, not married and around 28 years old. The values of this cluster were distinguishing by very high and positive existence value, very low and negative indirect value and very negative direct and bequest values.

Finally, the last cluster (n=111) had the same socioeconomic characteristic with the first cluster except of their income and marital status. The results of cluster analysis make it obvious that there is a clear differentiation between people with different income.

People with lower income differentiate their attitude towards environmental components of water resources values. The value of this cluster was distinguished by negative value only for the indirect value. Members of the fourth cluster seem to value river's ecosystem mainly for the bequest value. We could possibly justify this as the low economic status of participants becoming members of this cluster may lead them to become less sensitive towards the environment.

In cluster analysis the answer to CVM question was used as the variable by which to label cases. As it can be seen from Table 6 the percentages of rejection of CVM scenario are prominent in all clusters.

Table 6 Cluster membership by sample: *n* (%)

		Response to CVM scenario	
Cluster	n	YES N (%)	NO N (%)
1st	23	9 (39.13)	14 (60.87)
2nd	159	72 (45.28)	87 (54.72)
3rd	28	12 (42.9)	16 (57.1)
4th	111	49 (44.1)	62 (55.9)

4.3 Economic Value

For this CVM study, the dichotomous choice method, which seeks simple 'yes' or 'no' answers to an offered bid, is used. The dichotomous choice method is preferred to other methods (e.g., an open-ended method) because it is easier for respondents to react to the questions; households could respond keeping some budget constraint in view (i.e., the upper bounds on bids could be controlled); and it minimizes any incentive to strategically over-stated or under-stated WTP (Loomis, 1988; Moran, 1994; Ninan and Sathyapalan, 2005). The discrete choice model has become the most used approach for determining whether people are willing to pay for a non-market good (Del Saz-Salazar *et al.*, 2009). In cases that our dependent variable (WTP) had a dichotomous format (yes/no), a binary logistic regression model should be used (Halkos, 2006; Hosmer and Lemeshow, 2000).

In order to be able to calculate the WTP, we use the data from the questionnaire to identify the mathematical model that best fitted this set of data. We then are able to predict any WTP, provided that we know the values of the independent variables. That is, we have to formulate a function, which describes the relationship between a person's WTP (dependent variable) and a number of socio-economic characteristics (independent variables) that influence this choice (Hanley *et al.,* 1997) and variables are associated with responders' pro-environmental behavior and attitude towards the river (Kotchen and Reiling, 2000).

Specifically, dichotomous-choice models of CV responses show how environmental attitude is one of the most significant determinants of yes/no responses. For this research, the model specification was:

$$\text{logit}[\Pr(Y=1)]=f(\text{BID, NAT, GEN, AGE, MARITAL, EDUC, INC, ECOL\_BEH}, F_1, F_2, F_3, F_4)$$

where *Y* is our dichotomous-choice dependent variable (the response to the WTP question as Yes=1 and No=0), *BID* is the specified amount (in €) respondents were asked to pay, *NAT* refers to nativity if respondents are visitors or residents in the area, *GEN* refers to gender, *AGE* refers to the age of the respondent, *MARITAL* refers to the marital status, *EDUC* is the education level of respondents (in years), *INC* is respondent's income either (in € or in levels), *ECOL_BEH* corresponds to the ecological behavior of the respondents and F_1, F_2, F_3, F_4 are the extracted factors, named option and direct use values (F_1), bequest value (F_2), existence value (F_3) and indirect use value (F_4) respectively.

In Table 7, the first model (columns 2-3) includes all the extracted factors and other socioeconomic variables (like age, gender, marital status, ecological behavior) while the final model (columns 4-5) consists of the statistically significant variables and is presented as:[3]

$$\text{logit}[\Pr(Y=1)]=\beta_0 + \beta_1\,\text{BID} + \beta_2\,\text{NAT} + \beta_3\,\text{EDUC} + \beta_4\,\text{INC} + \beta_5\,F_1 + \beta_6\,F_4 + \varepsilon_i$$

where ε_i is the disturbance term with the usual properties.

Looking at Table 7, the coefficients have the expected signs. According to the obtained empirical results, respondents were sensitive to the price they were asked to pay. Bid amount (BID) was negative and significant, thus, higher BIDs (prices), resulted to lower probabilities of responding 'yes'. On the contrary higher income encourages support of the CV scenario, as income (INC) was positive and significant (in the proposed second model formulation). In many researches personal income has been hypothesized as a determinant of environmentally related behaviors (Mohai, 1985; Guagnano *et al.*, 1995). Jacobsen and Hanley (2008) investigate the effect of income in 46 CVM surveys. According to the results, the size of the income effect was not present in all cases.[4] In this study, in support of the CV scenario, the variable *income* had a positive and significant relation as in previous CVM studies which is consistent with economic theory.

Education level was found to significantly determine WTP, as the education increases the tendencies to pay will decrease. Perhaps better-educated people have (or felt that there could have) alternative ways to express their environmental concern (members

[3] Before estimating binary-choice models of yes/no responses all protest responses and observations with missing data were excluded.

[4] Hanemann (1984) showed how a theoretically correct specification would not include income as an independent variable.

of non-governmental organisations etc).[5] Nativity had a negative and highly significant effect on the probability of respondents answering "yes" or 'no' to the valuation question. Residents are more possible to participate in a CVM scenario. For the variable n*ativity* the results are in line with previous surveys as according to Dunlap *et al.* (2000) different environmental concern has been observed in different population samples. Leitch and Hovde (1996) point out that water resource can be valued from several perspectives that lead to at least four different types of value: owner, user, regional and social.

In our present research, residents were more willing to pay for river conservation than visitors. This is in line with Halkos and Matsiori (2012) who showed also that residents have a higher possibility to pay for water resources conservation than visitors. Finally, two of the four PCA factors were found to significantly determine WTP. Respondents classifying high use value are not willing to pay for conservation of the area on the contrary the factor "indirect use value" influenced positively respondents' WTP.

The model's Nagelkerke R^2 value was 0.23. All variables in the proposed model are statistically significant in all levels of significance with the exception of the variable *education* which is significant at the 5% level of significance. The last column presents the odds ratios ($e^{\hat{\beta}_i}$). We may compute the difference $e^{\hat{\beta}_i} - 1$ which estimates the percentage change (increase or decrease) in the odds $\pi = \frac{\Pr(Y=1)}{\Pr(Y=0)}$ for every 1 unit in X_i holding all the other independent variables (X's) fixed. The coefficient of BID is $\hat{\beta}_1$=-0.0501, which implies that $e^{\hat{\beta}_1}$=0.951 and $e^{\hat{\beta}_1}$-1=-0.049. This means that in relation to the BID the odds of WTP decrease by almost 5%

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[5] Positive trends in the relationship between respondents' WTP and education level were found by Engel and Pötschke (1998), Veisten et al. (2004), Potgieter (2005). So it is expected that people with higher level of education can understand the need for managing environmental resources better than others who are not well educated (Langford *et al.,* 1998).

ceteris paribus. Similarly, the coefficient of income is $\hat{\beta}_4 = 0.1205$, which implies that $e^{\hat{\beta}_2} = 1.128$ and $e^{\hat{\beta}_2} - 1 = 0.128$. This means that in relation to income the odds of WTP increase by 12.8% ceteris paribus. Looking at the rest of the variables and in a similar way, we see that for the cases of nativity, education and option and direct use values the odds of WTP decrease by about 68%, 8% and 27% respectively and increase by more than 28% in the case of indirect use values, all the other remaining fixed in each case.

The overall significance of the model is given by $X^2=74.06$ with a significance level of P=0.000 and 6 degrees of freedom. Based on this value we can reject H_0 (where H_0: $\beta_1=\beta_2=\beta_3=\beta_4=\beta_5=\beta_6=0$) and conclude that at least one of the β coefficients is different from zero ($X^2_{0.05,6}=12.592$). The Hosmer and Lemeshow value equals to 11.25 (with significance equal to 0.1879). The non-significant X^2 value indicates a good model fit in the correspondence of the actual and predicted values of the dependent variable.

Responses to WTP questions are associated to some degree with socioeconomic factors as income and education level. The amounts of WTP ranged from 1 to 61 €. The mean WTP was calculated by assuming no negative values for protection of Pinios river environment and using the formula suggested by Hanemann (1989):

$$E(WTP) = \left(\frac{1}{\beta_1}\right) * \ln\left(1 + \exp^{\beta_0}\right)$$

The mean WTP was approximately equal to €33.78 per person. Our empirical analysis illustrates that people who classify high indirect values of a river's ecosystem are more willing to pay than others. In the visitors group non-use values were dominated over use values.

Table 7: Econometric results of the proposed logit model formulations

	Logit models			
Variables	**Estimates**	**Odds Ratios**	**Estimates**	**Odds Ratios**
Constant	5.090 [0.000]		3.852 [0.000]	
BID	-0.0523 [0.000]	0.949	-0.0501 [0.000]	0.95113
Nativity	-1.169 [0.001]	0.311	-1.1383 [0.000]	0.32035
Gender	0.0515 [0.842]	1.053		
Age	0.0076 [0.56]	1.01		
Marital	-0.274 [0.236]	0.76		
Education	-0.138 [0.005]	0.87	-0.0816 [0.044]	0.92161
Income	-0.0001 [0.028]	0.99	0.1205 [0.050]	1.1280
Ecological Behavior	-0.3889 [0.180]	0.68		
F_1	-0.4064 [0.003]	0.67	-0.3110 [0.008]	0.7326
F_2	-0.0815 [0.568]	0.92		
F_3	0.102 [0.426]	1.11		
F_4	0.562 [0.000]	1.76	-0.24848 [0.003]	1.2820
Nagelkerke R^2	0.165		0.23	
LR χ^2_{12} LR χ^2_6	72.65 [0.000]		74.06 [0.000]	
Hosmer-Lemeshow			11.25 [0.1879]	
Log– Likelihood	-184.04		- 475.7321	

5. Conclusions

Decision-making processes to protect and conserve a natural resource (in our case a river) call for interdisciplinary knowledge in which biologists and economists collaborate with anthropologists and psychologists (Mascia *et al.*, 2003; Saunders *et al.*, 2006). This study investigates relationships among environmental attitudes and socioeconomic characteristics of responders to the economic value of Pinios River. For this reason responders, first, classified 47 items – components of the river's total value and then they were asked if were willing to pay for river's ecosystem conservation. The first aim of this study was to measure the natural area values and then to use the results in further tests to distinguish and compare different groups within the sample and explore the relationship between people's environmental attitude and willingness to pay for its conservation. Our results help to understand people's relation with the area and their level of environmental concern.

The constructed scale is a useful new instrument for measuring individuals' values for water resources. It can be used to identify the relative strengths of individuals' use and non-use values. The results from the factor analysis were overall satisfactory and they generally support the present scale as a reliable method for measuring a range of natural area values producing valid results across different populations and different environments. Previous use of scale for measuring people's values for an artificial lake showed that some benefits of such ecosystems (associated with use values) are valued higher and are important influences on the direction and intensity of conservation preferences (Halkos and Matsori, 2012). The empirical results confirmed the expectations that constructed lakes are highly valued for water supply and irrigation, energy production and improving residents' life quality, both now and in the future. Remarkably, they were also highly valued for the use of the Lake's waters for producing goods. Similarly and according to the results of our present study it is obviously that the proposed scale is a useful instrument that can be adapted according to the water resource as well as to people's characteristics.

The present scale can be used both for use and non-use values and can be intended as a general tool that can be applied across distinct populations to test whether different people (visitors or residents) are related with different values and attitudes towards the natural environment.

Cluster analysis showed that within each of the main populations, four different groups can be identified, based on their common values. These groups define different combinations of the values which people hold to water resources. The relative importance of each value, as reflected in their cluster membership, determines the decisions they are likely to make about the use or conservation of water resources. The results show that the inclusion of a number of socioeconomic variables, in addition to values, helps us to determine the decisions people make about the conservation or use of water resources areas. The results of PCA show that the scale can be used to explain people's environmental preferences and willingness to make sacrifices for the sake of the environment. The presence of the clusters indicates the way which people rate the importance of the four values relative to each other.

The results of our present study explain why individuals place values on a water resource. The information provided by our study is very important as a tool not only for a management decision for the study area but it may also help the considerable debate for the existence of some components of total environmental economic value and its utility in decision making process.

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