Logara, Ivana; Bergh, Jeroen C. J. M. van den. «Economic valuation of preventing beach erosion : comparing existing and non-existing beach markets with stated and revealed preferences». Journal of Environmental Economics and Policy, Vol. 3 Núm. 1 (gener 2014), p. 46-66. DOI 10.1080/21606544.2013.863742

Logara, Ivana; Bergh, Jeroen C. J. M. van den. «Economic valuation of preventing beach erosion : comparing existing and non-existing beach markets with stated and revealed preferences». Journal of Environmental Economics and Policy, Vol. 3 Núm. 1 (gener 2014), p. 46-66. DOI 10.1080/21606544.2013.863742

This document is the accepted manuscript version of the following article:
Logar, I., & van den Bergh, J. C. J. M. (2014). Economic valuation of preventing beach erosion: comparing existing and non-existing beach markets with stated and revealed preferences. Journal of Environmental Economics and Policy, 3(1), 46-66. https://doi.org/10.1080/21606544.2013.863742

Economic Valuation of Preventing Beach Erosion: Comparing Existing and Non-Existing Beach Markets with Stated and Revealed Preferences

Ivana Logar[a,b*], *Jeroen C.J.M. van den Bergh*[a,c,d,e]

[a] Institute of Environmental Science and Technology, Universitat Autònoma de Barcelona, Edifici Cn - Campus UAB, 08193 Bellaterra, Spain

[b] Swiss Federal Institute of Aquatic Science and Technology (EAWAG), Überlandstrasse 133, 8600 Dübendorf, Switzerland

[c] Department of Economics and Economic History, Universitat Autònoma de Barcelona, Bellaterra, Spain

[d] ICREA, Barcelona, Spain

[e] Faculty of Economics and Business Administration & Institute for Environmental Studies, VU University Amsterdam, Amsterdam, The Netherlands

*Corresponding author: ivana.logar@eawag.ch

Abstract

Predicted climate change is likely to increase beach erosion in the future, inducing higher costs of beach maintenance. Hence, additional funds for their protection will be required. We examine the willingness to pay (WTP) of beach visitors for preventing beach erosion in the form of daily beach entrance fees in Crikvenica, Croatia, by applying the contingent valuation method. This is the first beach valuation study for this country in transition which has emerged as an important Mediterranean tourist destination. The novelty of our study is that it compares WTP estimates for an existing and a non-existing beach market. This is done by conducting a survey at the beach where an entrance fee is already levied and at the nearest open-access beach. Based on the initial (follow-up) valuation question the stated WTP per adult per day for avoiding beach erosion equals €1.69 (€1.26) for the paid beach and €2.08 (€1.84) for the free beach. In addition, the travel cost method is employed. It reveals that consumer surpluses for visiting the paid and the free beach amount to €2.57 and €1.74, respectively.

Keywords: contingent valuation, Croatia, entrance fees, stated and revealed preferences, travel cost method.

1 Introduction

Due to anticipated climate change, in particular sea-level rise and a higher occurrence of extreme events, an increase in erosion of beaches is expected in the future (Bruun 1962; Nicholls and Hoozemans 1996; Mimura and Kawaguchi 1997; Klein et al. 1999). Beaches have high recreational values and are of great importance for the tourism industry, which could be considerably undermined by the loss of beaches. In the Mediterranean area tourism is one of the main economic activities, representing an important source of employment and foreign exchange revenues. Moreover, coastal tourism is its major component. All these characteristics also pertain to Croatia, the subject of the current study. This country has become a popular Mediterranean tourism destination in recent years. However, it differs from most other Mediterranean countries because, being part of Yugoslavia, it had a centrally planned economy until 1990 and is currently still in a process of economic transition. Its coastline length is similar to that of Spain when islands are included. In 2010, 85% of tourist arrivals and 94% of tourist overnight stays in Croatia were realized in coastal areas (CBSRC 2011), indicating the importance of beaches for the country's tourism industry. This article is to our knowledge the first beach valuation study for Croatia and one of the very few for Central and Eastern European countries.

As a result of a potential increase in beach erosion, many tourism destinations might require a substantial rise in funds for beach preservation and maintenance in the future. Many authors report on insufficient and declining public funds for environmental preservation and management of natural or protected areas (Lindberg 1998; Dharmaratne et al. 2000; Eagles et al. 2002; Baral et al. 2008; Reynisdottir et al. 2008). Taking into account the growth in tourist numbers, they propose entrance fees as a means of financing preservation and management of such sites.

The main objective of this article is to examine the willingness of beach visitors to pay for the costs of beach maintenance aimed at preventing erosion in the form of beach entrance fees. To this end, the contingent valuation method (CVM) is applied. Our study compares visitors' willingness to pay (WTP) for two beaches, namely one where an entrance fee is already levied and the nearest open-access beach. To our knowledge, no previous study has combined existing and non-existing markets in the context of beach valuation. Previous research that assessed the benefits of coastal protection against erosion includes Silberman and Klock (1988), Whitmarsh et al. (1999), Shivlani et al. (2003), and Saengsupavanich at al. (2007). We compare our results with the ones obtained in these studies.

In addition to stated preferences, this article identifies visitors' revealed preferences by using the travel cost method (TCM). In this way, we estimate (1) the WTP of the paid and free beach visitors for preventing beach erosion based on CVM, and (2) the consumer surplus that people derive from visiting the two beaches by employing TCM. In addition, we identify determinants of visitors' WTP, explore differences between the two visitor groups, and calculate total use values for the two beaches. Previous studies that apply both stated and revealed preferences in the context of beach valuation include Blakemore et al. (2000), Whitehead et al. (2000), Nunes and van den Bergh (2004), Landry (2005), and Whitehead et al. (2008).

The remainder of this article is organized as follows. Section 2 describes the case study area and survey design. Section 3 presents descriptive statistics and points out the main differences between the two beaches and their visitors. Section 4 discusses results of the CVM. Section 5 analyses travel cost data. Section 6 compares the two beach markets and the two methods. Section 7 concludes.

2 Study area and survey design

2.1 Description of the beaches

The beaches examined in this study are located in the town of Crikvenica in Croatia. The town is situated in the northern part of the Adriatic Sea. Its population in 2011 was 11,122. In 2011 it received a total of 237,430 tourists, which places Crikvenica among the top 15 tourism destinations in Croatia according to the number of tourist arrivals (CBSRC 2012). Around 85% of arrivals occurs during the summer period (June to September). Crikvenica's tourism is thus characterized by a high seasonality of demand, which, among other problems, leads to congestion of the beaches (Logar 2010).

Examples of existing beach entrance fees are rare. In Crikvenica, however, a beach entrance fee has been in use since 1894, with the exception of few short periods, such as the one characterized by severe political conflict in the early 1990s. All beaches in Croatia are public goods but can be granted concessions. Several beaches in Crikvenica are given concessions, including the 'town beach', which is being managed by the municipal utility company. However, this is the only beach where a beach entrance fee is being levied. There are two reasons for this. Firstly, it is the only sand beach in Crikvenica. Even though the beach is natural, annual nourishment is necessary to compensate for erosion. This makes its maintenance relatively costly. The texture of other beaches is pebble or rock. Secondly, the fee facilitates offering additional services and equipment for sports activities, which do not exist at other beaches in the town.

The fee amount is €1.66 per person day for adults and half of this price for children. It is being charged during summer months only. The beach is enclosed by a fence and the money is being collected at four entrance points. The costs of maintaining the beach amounted to €301,000 in 2007, which includes a cost of €17,000 to charge the fee. Revenues from the beach in the same year equaled €313,000.

The valuation exercise was carried out both at the town beach and at the nearest free beach. These are the two most important and largest beaches in Crikvenica. Their main characteristics are presented in Table 1. According to some authors, around 4 m^2 per person should be the minimum required beach area (Pearce and Kirk 1986; Yepes 1998). These two beaches have hence possibly reached respective carrying capacities in the peak season (see Table 1). Introducing a (higher) beach entrance fee could therefore apart from raising funds for beach protection also help prevent overcrowding (a regulatory effect).

[TABLE 1 AROUND HERE]

2.2 Survey design

This study focuses on estimating the *use* values associated with the beaches. Hence, our target population are users of a particular beach, i.e. beach visitors. *Non-use* values are likely to be modest since the beaches under consideration do not possess unique features.

The survey questionnaire consisted of six parts. The first two parts dealt with the characteristics of respondents' visit to Crikvenica and their beach visit. The third part collected data about travel costs and expenditures. In the fourth part the respondents were asked about their preferences regarding various beach characteristics. In addition, they were requested to evaluate quality aspects of the beach they were visiting at the moment.

The fifth part contained a description of the hypothetical scenario and the valuation questions. The scenarios differed somewhat between the two beaches. All respondents were explained that the main reason for charging the beach entrance fee at the paid beach is because erosion is causing a need to pour new sand every year, which involves costs. They were further told that these costs could not be covered from the town budget, so that it was decided to ask the people who actually use the beach to pay for them. Respondents at the free (paid) beach were told that the (increased) problem of erosion has recently been noted at the particular beach and that in order to prevent beach loss due to erosion over the next 10 years, an entrance fee will have to be levied (increased). The valuation questions used in the questionnaire version for the paid beach were formulated in a way that elicited the total entrance fee amount (not the increment above the current fee).

Concerning the welfare measure and the elicitation format, we have followed the NOAA panel guidelines (Arrow et al. 1993). A double-bounded dichotomous choice elicitation format was adopted. Hanemann et al. (1991) and Kanninen (1993) recommend using this format as it is statistically more efficient than the single-bounded dichotomous choice approach. In double-bounded dichotomous choice, however, starting point and yea-saying biases might occur (Andreoni 1989; Mitchell and Carson 1989; Bateman et al. 2002; Chien et al. 2005). The starting point bias arises when the initial bid influences respondents' WTP amount, while the yea-saying bias refers to the tendency of some respondents to agree with the interviewer's request regardless of their true views (Mitchell and Carson 1989). As regards the choice of a payment vehicle, beach entrance fee per person per day seemed the most suitable option as it is already being used at the paid beach.

A follow-up question was included for those respondents who stated a zero WTP in order to identify protest bids. Respondents were further asked about their attitudes towards beach user fees. The last part of the questionnaire captured socio-economic characteristics of respondents.

2.3 Survey administration

Face-to-face surveys were chosen as a means of data collection because they generally lead to the highest survey response and allow for using the double-bounded dichotomous choice elicitation format (Nunes and van den Bergh 2004). Systematic sampling was used in a way that every tenth visitor at the beach was approached. The survey was conducted in Croatian, English and German languages. This enabled embracing the majority of domestic and foreign beach visitors. Ten experts reviewed the questionnaire during the design phase. The questionnaire was pre-tested in June 2008. Information obtained through 80 pilot surveys ensured an adequate bid design and further improvements in formulating questions and the hypothetical scenarios. Four versions of the survey were developed for each beach, differing in bid amounts offered to respondents. In July 2008 a total of 745 surveys was carried out, including 379 surveys at the free beach and 366 at the town beach. Response rates were 69% and 79%, respectively.

3 Descriptive statistics

Complete information on descriptive statistics for the free and the paid beach is listed in Table 2. There are some notable differences between the two beaches and their visitors' characteristics, including composition of the visitors, their motivation for choosing the beach, and preferences regarding beach texture.

[TABLE 2 AROUND HERE]

The average travel group size, number of children in the travel group, number of other destinations visited on this trip, and accommodation costs per night per adult are significantly higher for the visitors of the paid beach than for those who visit the free beach. The paid beach visitors also have significantly higher travel costs per day, which can be explained by a higher share of these visitors coming from abroad.

As expected, visitors at the paid beach are better informed about the reasons for levying a beach entrance fee. Nevertheless, they are also not very well informed. Since earmarking revenues and providing more information to the visitors about the reasons for levying a beach entrance fee can improve their acceptance of fees (Eagles et al. 2002), this might be an important insight for the managers of the paid beach.

Socio-economic characteristics vary between the two visitor groups. A *t*-test shows that respondents at the paid beach are on average significantly younger ($t=-4.483$, $p<0.01$) and have a significantly higher net monthly household income than those at the free beach ($t=4.403$, $p<0.01$).

The proportion of protest bids is higher at the free beach, namely 12.7% versus 8.5% at the paid beach. The most important reason for being unwilling to pay any positive amount of money, mentioned by 51% of respondents, is that they are not the ones who should pay for these costs. Another 23% answered that they do not believe there is an erosion problem at the beach, while 26% provided other reasons. These mainly included the opinion that beaches are public goods, thus expressing dissatisfaction with the payment vehicle.

Protest bids were excluded from the analysis (Strazzera et al. 2003a, 2003b). However, they were analyzed separately in order to control whether they differ from the rest of the sample. We found that there is a significantly higher share of town residents and domestic visitors among protest bids. This is consistent with the finding of Mathieu et al. (2003) that visitors from Yugoslavia were more likely to refuse to pay an entrance fee for protecting marine parks in the Seychelles. They suggest that these visitors might be more used to public rather than private funding of natural resources. Our results support this finding since a higher than proportional share of domestic visitors stated that either local or national government should mainly pay for the costs of beach maintenance.

4 Contingent valuation analysis

4.1 Estimation of the WTP function

In a double-bounded dichotomous choice elicitation format, for each respondent *j* there are four possible outcomes based on the answers to the initial and the follow-up bid questions: “yes-yes”, “yes-no”, “no-yes”, and “no-no”. According to economic theory, it is expected that the proportion of “yes-yes” responses drops with the higher amounts respondents are asked to pay and *vice versa*. Table 3 shows bid amounts used for each beach and the proportion of WTP responses that fall into each interval. The responses are in line with economic theory and well distributed across the intervals, indicating an appropriate design of the bids.

[TABLE 3 AROUND HERE]

WTP estimates derived from traditional interval-data models show great sensitivity to the choice of the distribution for WTP (Haab and McConnell 1997). Moreover, these models assume that respondents have a single true value when answering both the initial and the follow-up valuation questions, which is not always the case (Hanemann et al. 1991; Leonard 1993). Bivariate probit model suggested by Cameron and Quiggin (1994) relaxes this assumption by allowing the WTP values elicited from the two questions to be the same or different. We apply this model, in which underlying WTP values can be described by the following equations:

$$WTP_{i1} = x_i\beta_1 + \varepsilon_{i1}$$

$$WTP_{i2} = x_j \beta_2 + \varepsilon_{i2},$$

where WTP_{i1} represents *i*th respondent's willingness to pay response to the first and WTP_{i2} to the second valuation question; x_i and x_j are vectors of explanatory variables (which may vary for the two WTP values); β_1 and β_2 are vectors of parameters to be estimated; ε_1 and ε_2 denote error terms, which are assumed to be jointly normally distributed with means zero, variances σ_1^2 and σ_2^2, and a correlation coefficient ρ. The response to the initial valuation question is "yes" ("no") when $x\beta + \varepsilon \geq B$ ($x\beta + \varepsilon < B$), where B represents the bid amount assigned to the *i*th respondent.

The joint probabilities for the four possible response outcomes can be written as:

$$P^{yy} = \Pr(y_{i1} = 1, y_{i2} = 1) = 1 - \Phi(z_{i1}, z_{i2}, \rho) - \Phi(z_{i1}) - \Phi(z_{i2})$$

$$P^{yn} = \Pr(y_{i1} = 1, y_{i2} = 0) = \Phi(z_{i2}) - \Phi(z_{i1}, z_{i2}, \rho)$$

$$P^{ny} = \Pr(y_{i1} = 0, y_{i2} = 1) = \Phi(z_{i1}) - \Phi(z_{i1}, z_{i2}, \rho)$$

$$P^{nn} = \Pr(y_{i1} = 0, y_{i2} = 0) = \Phi(z_{i1}, z_{i2}, \rho),$$

where y_{i1} and y_{i2} denote binary indicator variables to the first and the second valuation questions (1 if a response is "yes", 0 if a response is "no"); $z_{i1} = (B_{i1} - x_i\beta_1)/\sigma_1, z_{i2} = (B_{i2} - x_j\beta_2)/\sigma_2$; $\Phi(\cdot)$ represents the standard normal cumulative density function; and ρ the correlation coefficient. The parameters are estimated by maximizing the following log-likelihood function:

$$\log L = \sum_{i=1}^{N} (1 - y_{i1})(1 - y_{i2}) \log P^{nn} + (1 - y_{i1}) y_{i2} \log P^{ny} + y_{i1}(1 - y_{i2}) \log P^{yn} + y_{i1} y_{i2} \log P^{yy}$$

The estimation results of the three separate WTP functions obtained for the paid beach, the free beach, and the two beaches jointly are shown in Table 4. Equation 1 (2) in the table corresponds to the response to the initial (follow-up) valuation question.

[TABLE 4 AROUND HERE]

Factors that influence the stated WTP of respondents to both valuation questions significantly and in the same direction in all three models include: bid amount offered to respondent (negative effect), expressing agreement with introducing entrance fee to other beaches (positive effect), and a belief that the local government should mainly pay the costs of beach maintenance (negative effect). The result indicating the negative relationship between the bid amounts and stated WTP is in line with economic theory, while the signs of the other two variables are also as expected. A decision to visit the town mainly because of nice beaches significantly and positively influences the WTP of respondents, with the exception of the WTP of paid beach visitors derived from the follow-up valuation question, on which it has no significant effect. Beach visitors who are more satisfied with their visit to the beach are willing to pay significantly more for its protection against erosion than other visitors. This "satisfaction variable" is only not significant in explaining the WTP of free beach visitors obtained from the follow-up valuation question. Household income has a positive and significant effect on the stated WTP of the paid beach visitors. In the model for the free beach, age and employment status of respondents explain their WTP better than their household income. Age and age squared variables are significant in the free and pooled beach models with a negative and a positive sign, implying that there is a U-shaped relationship between the age of respondents and their WTP (i.e. younger and older respondents are willing to pay more than middle-aged respondents). Free beach respondents who do not work are willing to pay significantly less than those who work. This effect is not observed among the paid beach visitors.

The correlation coefficient (ρ) is positive and highly statistically significant in all three models, which means that bivariate probit is an appropriate model in this case. Moreover, it indicates that there is a positive correlation between responses to the initial and the follow-up valuation questions, although this correlation is not perfect. The correlation between error terms of the two WTP values is lower for the paid than for the free beach (ρ=0.702 and ρ=0.911, respectively).

4.2 WTP estimate results and aggregation

In a linear WTP function, the mean WTP equals the median and is calculated as $WTP = \frac{\bar{X}\beta'}{\beta_1}$, where $\bar{X}_{(1\times k-1)}$ represents the row vector of sample means (excluding the bid variable), $\beta'_{(k-1\times 1)}$ is the column vector of estimated coefficients (including a constant term and excluding the coefficient of the bid variable), while β_1 is the estimated coefficient for the bid variable. Since the underlying WTP values for the two valuation questions are not identical, welfare measures based on the first and the second valuation questions slightly differ. Mean/median WTP estimates for the two beaches and their corresponding 95% confidence intervals are reported in Table 4. The confidence intervals are calculated based on the Krinsky-Robb procedure using 10,000 replications (Krinsky and Robb 1986). Since reported welfare estimates for the town beach include the current fee, this amount should be deducted in order to derive respondents' WTP for preventing erosion of the paid beach. The final results show that visitors at the town beach are on average willing to pay €1.69 (€1.26) per person per day in addition to the existing entrance fee for preventing the beach loss due to erosion according to the first (second) valuation question. Visitors at the free beach are willing to pay €2.08 (€1.84) for the same purpose.

For comparison, a study by Silberman and Klock (1988) obtained a mean WTP of $3.90 (€3.07)[1] for access to a stretch of ocean beach in New Jersey after beach nourishment. Whitmarsh et al. (1999) show that the mean gain from beach nourishment in Hampshire, UK, is £1.07 (€1.46) per visit. Shivlani et al. (2003) found that the mean WTP for beach nourishment that would result in improved recreational quality in south Florida equals $1.69 (€1.48) per visit. A study of Saengsupavanich et al. (2007) valued beach protection benefits from port-induced erosion. Their estimate of the beach use value equals $0.69 (€0.58) per visit. Therefore, average per capita WTP figures for preventing beach erosion estimated in this article have the same order of magnitude as the values reported in other studies.

Furthermore, we compare the WTP between various visitors groups. The comparison is based on the pooled model so as to allow for a sufficient number of observations for less represented visitor groups. This implies that WTP estimates for the paid beach include the current entrance fee. The reported WTP values are derived from the second valuation question. Respondents who do (not) have a second home in Crikvenica are on average willing to pay €1.14 (€2.44) per person per day for preventing the beach erosion. A statistical test based on a resampling procedure showed that the difference in the mean/median WTP between these two groups is statistically significant. Given the relatively low number of observations for the second-home owners, these results have to be interpreted with caution. Nevertheless, discrepancies might be explained by many second home owners who feel that they are paying utilities in Crikvenica during the whole year and thus consider that they are in this way already contributing to the

[1] Converted by using data on purchasing power parities (PPP) for GDP from OECD Statistics. For 1988 an average of PPPs for all current euro zone countries was applied.

maintenance of the town facilities, including beaches. Welfare measures obtained with CVM for foreign visitors and Croats, Bosnians and Serbs who live abroad are very similar, amounting to €2.56 and €2.80, respectively. Domestic visitors have a lower WTP, namely €1.92. A resampling test indicates that there is a statistically significant difference in the mean/median WTP between domestic visitors and Croats, Bosnians and Serbs who live abroad, but not between domestic and foreign visitors. Differences in income levels between these three groups cannot explain well differences in their WTP. The mean household income of domestic visitors is €1,399, of foreign visitors €2,229, and of Croatian, Bosnian and Serbian visitors who live abroad €3,156. Moreover, CVM models have shown that income has no significant effect on the stated WTP.

The results were then extrapolated to the beach user population in order to derive annual values of preventing erosion of the beaches. The user population was determined more easily and precisely than in other studies because it is well documented for the paid beach due to the entrance fee. The data is obtained from the municipal utility company. The free beach has a density that is almost the same as that of the paid beach, but has approximately half of its size and therefore user population. If applying the welfare estimates based on the initial (follow-up) valuation question, the annual value of preventing the erosion of the free beach amounts to €171,858 (€152,028), while that of the paid beach equals €286,078 (€213,289). Difference in the total annual values of beach erosion prevention between the two beaches stems primarily from differences in their size and hence the number of beach users.

5 Travel cost method estimations

5.1 Specification of the travel cost model

We apply the individual travel cost method to estimate the recreation demand functions for the two beaches under study. A derived Marshallian demand curve is used to estimate consumer surplus (CS), which is considered as a good approximation of a welfare measure. CS that visitors derive from visiting the beaches enables us to estimate their total annual use values.

Because the number of trips per person per year represents a nonnegative integer, count-data regression models such as Poisson or negative binomial model are the most appropriate statistical approaches (Shaw 1988; Creel and Loomis 1990; Hellerstein 1991; Englin and Shonkwiler 1995). In addition, two problems arise when using on-site sampling, truncation and endogenous stratification. The former refers to sampling only from the user population and the latter to a higher probability of sampling individuals who visit the site more frequently. Failure to account for these problems will result in biased estimates (Bockstael et al. 1986; Shaw 1988; Smith 1988; Creel and Loomis 1990; Hellerstein 1992). The standard Poisson model assumes that the conditional mean of the dependent variable is equal to the conditional variance and should only be used when the dispersion parameter is not statistically different from zero (Englin and Shonkwiler 1995). In a case of over-dispersion, the use of the negative binomial estimator with mean λ and dispersion parameter α is more appropriate. For our models, the null hypothesis of no over-dispersion $(\alpha = 0)$ is rejected with a high degree of confidence, indicating that the negative binomial model is more appropriate. We use a model developed by Englin and Shonkwiler (1995) which corrects for both truncation and endogenous stratification. This gives rise to the following sample density function (representing the probability of an individual i to take y trips) with mean λ_i and dispersion parameter α_i:

$$h\left(y_i \middle| X_i\right) = \frac{y_i \Gamma(y_i + 1/\alpha_i) \alpha_i^{y_i} \lambda_i^{y_i - 1} \left[1 + \alpha_i \lambda_i\right]^{-\left(y_i + 1/\alpha_i\right)}}{\Gamma\left(y_i + 1\right) \Gamma\left(1/\alpha_i\right)}$$

where $\Gamma(\cdot)$ denotes gamma function and X_i are explanatory variables used in the model.

The recreation demand functions for the two beaches were specified as:

$$V_i = f(X_{TCi}, X_{MDi}, X_{Si}, X_{Vi}; \beta) + \mu_i$$

where V_i denotes the number of visits taken by each individual i to the particular beach over the last twelve months, X_{TCi} travel costs, X_{MDi} multiple-destination trips and its interaction with travel costs, X_{Si} beach characteristics, X_{Vi} visitors' characteristics, β vector of parameters to be estimated, and μ_i the error term. Since the count-data model is equivalent to the semi-log demand function, the consumer surplus per trip is estimated as $-1/\beta_{TC}$ (Creel and Loomis 1990). According to demand theory, the price of visiting substitute sites affects demand for a good and should be included in the model. However, many studies omit this variable in practice because it is usually highly correlated with the price of a site under study (Ward and Beal 2000). For the same reason price substitute effects are not included in our models.

The respondents were asked in the survey how many visits to the beach at which they were surveyed they have taken in the past. In order to derive the average annual number of trips, we assumed that the foreign visitors take one trip per year. This assumption seems reasonable because when the total number of respondents' previous visits to the beach is divided by their age, the data reveals that only nine out of a total of 366 foreign respondents visited the beaches more than once a year. Moreover, the average distance of a return trip for foreign visitors is 1465 km (as opposed to 421 km for domestic respondents). It thus seems very likely that foreign visitors would make such a long trip only once a year, particularly if one takes into account that 95% of them travelled either by car or by bus. Further support for this assumption is that the main bathing season in Crikvenica lasts two months (July and August). This implies that it is unlikely that foreign visitors would travel to the beach more than once in such a short period of time.

For domestic visitors the approach in which the previous number of trips to the beach is divided by respondents' age did not allow sufficient variation in the dependent variable. We hence calculated the number of trips as [number of previous visits/(age-17)]+1. The reasoning behind it is that all respondents are at least 18 years old, so the number of their previous visits needs to be divided by the difference between their age and the number 17, which sets the minimum value of denominator to one. Adding one to the resulting term reflects a visitor's current visit. Non-integer values were approximated by the nearest integer. For town residents, information about the exact number of annual beach trips was available.

The generalized travel costs consist of transportation costs, travel time, parking costs, and the beach entrance fee. Although there is a consensus on the importance of incorporating the opportunity cost of travel time into the trip price in the TCM literature, different approaches on how to measure time costs have been suggested (Cesario 1976; McConnell and Strand 1981; Smith et al. 1983; Bockstael et al. 1987). Our model applies the Cesario approach, in which the travel time is valued at 1/3 of the wage rate. Despite recommendations of some authors (Smith et al. 1983; McConnell 1992; Freeman 2003) to include the value of time spent on the site into travel costs, this is rarely done. In our case, the onsite time is assumed to be utility-enhancing (beach recreation) and was thus not treated as a cost.

The length of stay is another relevant issue to be considered. Ideally, all observed trips should be of the same length. Demand recreation models traditionally include only single-day trips. However, only 14% of respondents in our study take one-day trip, so excluding the rest of the sample may affect the welfare estimates considerably. Although some studies exclude multiple-destination trips from the analysis, they are a legitimate part of the total economic benefits of a site (Loomis 2006). Yeh et al. (2006) provide evidence that ignoring multiple-day and multiple-purpose trips may seriously bias the results. For this reason, we exclude neither multiple-destination nor multiple-day trips from the analysis, but we control for their effects. We use travel costs for all persons traveling together and for the entire trip. Following Loomis (2006), once the CS per trip is derived, it is further divided by the median number of adults in the travel group and the median number of days on the trip.

Apart from the travel costs, other explanatory variables in our models include a dummy variable, which distinguishes between single and multiple-destination trips, and its interaction with travel costs. These variables are expected to capture the average shift and rotation of recreation demand function for multiple-destination trips (Parsons and Wilson 1997). The site characteristics variables include cleanliness of the beach, cleanliness of the sea water, density of people at the beach, quietness, and landscape. Their quality is based on the perception of the visitors, who were asked to evaluate each of these beach characteristics as very good, good, neutral, poor, or very poor. The dummy variables indicating very good quality were used in the models. The final set of variables represents socio-economic characteristics of visitors.

5.2 Results of the travel cost models

Results of the recreation models for the two beaches are presented in Table 5. Most of the estimated coefficients have expected signs. In both models the travel cost coefficients are negative and statistically highly significant. Such results are consistent with the theoretical expectations, as it means that an increase in the travel costs will decrease the number of trips to the site. We found no statistically significant effect of multiple-destination trips on the total number of trips taken to any of the two beaches during the year. The interaction term between multiple-destination trips and travel costs is also not significant in both models. Perhaps a somewhat surprising result is that paid beach visitors who perceived sea water quality as very good took fewer trips to the beach than other visitors. Similarly, visitors at both beaches who perceived density of people at the beach as very good also took significantly fewer trips. Bell and Leeworthy (1990), however, obtained the same result. Both models indicate that older visitors tend to take fewer trips to the beaches than younger ones. In the case of the paid beach other socio-economic characteristics of visitors are not significant, while in the free beach model the income of visitors has a significantly positive effect on the number of trips taken to the beach. This is logical since the average income of free beach visitors is significantly lower than that of the paid beach visitors and thus plays a more important role when deciding whether to take a trip or not. Moreover, free beach visitors who work take significantly fewer trips compared to the ones who do not work.

[TABLE 5 AROUND HERE]

CS estimates derived from the TCM are standardized into values per person per day in order to correct for differences in the travel group sizes and the length of trips. The resulting CS that visitors derive from going to the paid beach equals €2.57 while for the free beach it amounts to €1.74 per person per day. Based on these results, the total annual use values are estimated at €435,042 for the paid beach and €143,766 for the free beach.

Some results of the sensitivity analysis might be worth mentioning. Randall (1994) argued that the correct way to measure travel costs is according to the perception of the costs by visitors as these determine recreation decisions. Respondents in our survey were asked to state their travel costs in order to test this effect. Models including this variable yielded somewhat lower CS estimates than the models using estimated travel costs. The difference was more prominent in the case of the paid beach, which could be due to higher travel costs of these visitors, making their own estimations more difficult and hence less precise. The predictive power (in terms of pseudo R^2) of the models with stated travel costs is similar to those that use estimated travel costs. In addition, Randall (1994) pointed out the problem of endogenous onsite costs. Time spent onsite, accommodation and dining expenditures can represent a considerable portion of the total cost of a trip, but they usually depend on respondents' endogenous choices. To address this issue, we apply a quasi-Marshallian demand model developed by Landry and McConnell (2007). The coefficients of predicted onsite costs are not statistically significant in neither of the two beach models. The CS estimates derived from these models are not significantly different from those obtained with the reduced Marshallian demand models. Therefore, our results confirm the findings of Landry and McConnell (2007), which show that the two models produce similar results. For this reason, we use the standard demand model in the main analysis.

Furthermore, total annual use values of the beaches were computed based on the current number of beach visits. However, if a (higher) entrance fee would actually be introduced the number of visits would decrease given a downward slope of the travel demand curve. The change in the number of trips can be predicted using the estimated travel cost models. The demand function for the paid beach has the form $\ln \lambda = 0.1188 - 0.0195TC$ and the one for the free beach $\ln \lambda = 3.2366 - 0.0383TC$, where λ is the expected number of trips and TC the travel cost of a single trip. If the WTP value derived from the first valuation question in CVM would be added to the existing entrance fee at the paid beach, the number of trips to this beach would decrease by 3.29%. If the WTP estimate based on the first valuation question would be applied as a new fee at the free beach, the number of trips to that beach would drop by 7.65%. On the other hand, if estimated CS from the TCM would be implemented as the entrance fee levels, the number of visits would fall by 1.76% (6.44%) at the paid (free) beach. In addition, levying an entrance fee on the pebble (free) beach is likely to shift demand towards the sand (paid) beach because its price advantage would in that case diminish (to the extent that would depend on the difference in fees between the two beaches), especially given that most beach visitors have expressed a preference for sand over pebble beaches.

6 Comparisons: methods and markets

Carson et al. (1996) conducted a meta-analysis comprising 616 comparisons and found that the mean ratio of contingent valuation to revealed preference estimates is 0.89. In our case, the two methods are not directly comparable because CVM is measuring WTP for preventing beach erosion, while TCM estimates CS that people derive from visiting the beaches. Nevertheless, the relationship between the welfare estimates obtained with these two methods deserves some attention. CS for the free beach is very similar to the WTP for preventing erosion of this beach derived from the follow-up valuation question and it is slightly lower than the WTP obtained with the initial question (see Table 6). For the paid beach, CS that visitors derive from going to this beach is a factor 2 (1.5) higher than their WTP for beach erosion prevention estimated based on the second (first) valuation question. However, if the current fee is added to the WTP values, the welfare estimates obtained from CVM become higher than CS derived from the TCM. In this case, CS estimates for both beaches fall within the 95% confidence intervals around the WTP values obtained from the follow-up valuation questions. Although the two methods value different beach aspects, respondents' WTP for preventing beach erosion seems to be closely related to the CS they derive from visiting the beaches. Higher WTP than CS values might suggest that most of respondents want to keep the option to use the beaches in coming years. In this case, some part of the WTP reflects an option value, i.e. a non-use value. Generally, a higher WTP estimate can indicate the presence of various upward biases, notably hypothetical, strategic, embedding and warm glow effects. However, WTP values elicited for public goods which are traded in markets or which the individuals are familiar with, as is the case in our study, are expected to have limited hypothetical bias (Mitchell and Carson 1989). Dichotomous choice elicitation techniques, used here, minimize the impact of strategic bias (Carson et al. 2001). The embedding effect is not of major concern in our study since respondents are familiar with the good and its scope. Finally, the warm-glow effect is neither expected to be significant as the beaches do not represent a pure natural environment and as the study focuses on use values. Therefore, we believe that in this study the bias in WTP estimates is very low.

[TABLE 6 AROUND HERE]

The comparison of existing and non-existing beach markets (i.e. paid and free beach) has yielded some interesting insights. Even though the two beaches differ in several aspects, each one has a clear advantage which compensates for the differences to some extent. The free beach is closer to the town center, while the paid beach is the only sand beach in the town and has somewhat better facilities. The results indicate that the WTP estimates for preventing erosion are higher for the free than for the paid beach. This might be the case because the paid beach visitors may consider that part of the current fee should be used for preventing beach erosion and their stated WTP is therefore marginal. Furthermore, WTP estimates for preventing erosion at the free beach are slightly higher than the current entrance fee at the paid beach. This confirms both the validity of the methods and a proper level setting of the levy. As expected, CS that people derive from visiting the beaches is higher for the paid than for the free beach. The reasons are better facilities at the paid beach and a preference for sand over other beach textures by most beach visitors. An interesting question that arises from this research is whether sand beaches have higher use values than other beach types. The results of our study provide a positive answer, but more research on the topic is needed in order to draw definite conclusions.

7 Conclusions

This article has presented an economic valuation of preventing erosion of two beaches in Crikvenica, Croatia. Given predicted climate change, it is expected that the threat of beach erosion will augment, leading to increased costs of their maintenance and raising the relevance of funding for beach erosion prevention. This study has investigated the willingness of beach visitors to pay for such protection in the form of a daily beach entrance fee. Moreover, it has estimated recreational benefits provided by these two beaches.

The novelty of our study is twofold. First, it examines willingness to pay (WTP) for a beach where a beach entrance fee already exists and for the nearest free beach. This enables a comparison of an existing and a non-existing market for a recreational public good. In addition, we applied both stated and revealed preference valuation methods so as to estimate the value of preventing beach erosion as well as total use values of the beaches.

Table 6 shows WTP estimates for preventing erosion of the two beaches obtained with the contingent valuation method (CVM) and the consumer surplus that an average visitor derives from visiting the beaches estimated with the travel cost method (TCM). Both welfare measures are presented on a daily per person and annual basis. The share of current maintenance costs in total annual value is reported in the case of the paid beach. CVM results indicate that the WTP for preventing beach erosion is somewhat lower at the paid than at the free beach and that as such it is insufficient to cover the current maintenance costs of the paid beach. Only if part of the current entrance fee would be allocated to erosion prevention there would be sufficient funds for covering beach maintenance costs. Results of the TCM imply that the total annual use value of the paid beach is substantially higher than that of the free beach. This can be explained by the fact that the visitors of the paid beach have higher travel costs than the free beach visitors because they travel larger distances and they have to pay the current beach entrance fee. In addition, the paid beach is double in size and receives double the number of visitors. Hence, when extrapolating the results to the total user population, the paid beach use value becomes considerably higher.

The results of this study cannot be generalized, but they indicate that beach entrance fees might be a useful tool for raising funds for beach preservation. Nevertheless, caution and further research are needed before making a final decision on the implementation of a beach user fee. Differential entrance fee rates might be considered in order to avoid double-charging of visitors and to enable equitable distribution of costs among various visitor groups (by taking into account differences in income, time spent on the beach, etc.). Other payment vehicles such as (higher) tourist or environmental taxes can be investigated. In addition, it would be useful to examine price elasticities in tourism. A study by Stručka (2000), for instance, has shown that demand for Croatian tourism is price-elastic in most of its major source markets (six out of nine), meaning that an increase in price will not compensate for the loss caused by fewer tourists. More variation in beach types and services can shed light on what are the most important factors of influence on use and non-use values associated with beaches.

Acknowledgements

The authors thank Wouter Botzen, Michael Creel, Giorgos Kallis, Joan Martínez Alier and Filka Sekulova for valuable comments. This research was supported by the FPU program of the Spanish Ministry of Education and Science.

References

Andreoni, J. 1989. "Giving with impure altruism: applications to charity and Ricardian equivalence." *Journal of Political Economy* 97 (6): 1447-1458.

Arrow, K., Solow, R., Portney, P.R., Leamer, E.E., Radner, R., and Schuman, H. 1993. "Report of the NOAA panel on contingent valuation." *Federal Register* 58 (10): 4601-4614.

Baral, N., Stern, M.J., and Bhattarai, R. 2008. "Contingent valuation of ecotourism in Annapurna conservation area, Nepal: Implications for sustainable park finance and local development." *Ecological Economics* 66 (2-3): 218-227.

Bateman, I.J., Carson, R.T., Day, B., Hanemann, M., Hanley, N., Hett, T., Jones-Lee, M., Loomes, G., Mourato, S., Özdemiroglu, E., Pearce, D.W., Sugden, R., and Swanson, J. 2002. *Economic valuation with stated preference techniques: A manual*. Cheltenham: Edward Elgar.

Bell, F.W., and Leeworthy, V.R. 1990. "Recreational demand by tourists for saltwater beach days." *Journal of Environmental Economics and Management* 18 (3): 189-205.

Blakemore, F.B., Williams, A.T., and Ozhan, E. 2000. "Tourist evaluation of Olu Deniz beach (Turkey) using contingent valuation and travel cost approaches." *World Leisure Journal* 4: 48-55.

Bockstael, N.E., Hanemann, W.M., and Strand, I.E. 1986. *Measuring the benefits of water quality improvements using recreation demand models,* Vol. II. Report to the U.S. Environmental Protection Agency. Department of Agricultural and Resource Economics, University of Maryland.

Bockstael, N., Strand, I., and Hanemann, W.M. 1987. „Time and the recreational demand model." *American Journal of Agricultural Economics* 69 (2): 293–202.

Bruun, P. 1962. "Sea-level rise as a cause of shore erosion." *Journal of the Waterways and Harbors Division* 88: 117-130.

Cameron, T.A., and Quiggin, J. 1994. "Estimation using contingent valuation data from a "dichotomous choice with follow-up" questionnaire." *Journal of Environmental Economics and Management* 27 (3): 218-234.

Carić, H., Klarić, Z., and Čorak, S. 2007. *Studija turističkog prihvatnog kapaciteta destinacije Crikvenica*, Zagreb: Institute for Tourism.

Carson, R.T., Flores, N.E., Martin, K.M., and Wright, J.L. 1996. "Contingent valuation and revealed preference methodologies: comparing the estimates for quasi-public goods." *Land Economics* 72 (1): 80-99.

Carson, R.T., Flores, N.E., and Meade, N.F. 2001. "Contingent valuation: controversies and evidence." *Environmental and Resource Economics* 19 (2): 173-210.

CBSRC 2011. *Statistički ljetopis 2011*. Zagreb: Central Bureau of Statistics of the Republic of Croatia. Accessed September 4, 2012. http://www.dzs.hr.

CBSRC 2012. *Priopćenja. Turizam u 2011*. Zagreb: Central Bureau of Statistics of the Republic of Croatia. Accessed September 4, 2012. http://www.dzs.hr.

Cesario, F. J. 1976. "Value of time in recreation benefit studies." *Land Economics* 52 (1): 32-41.

Chien, Y.L., Huang, C.J., and Shaw, D. 2005. "A general model of starting point bias in double-bounded dichotomous contingent valuation surveys." *Journal of Environmental Economics and Management* 50 (2): 362-377.

Creel, M., and Loomis, J.B. 1990. "Theoretical and empirical advantages of truncated count data estimators for analysis of deer hunting in California." *American Journal of Agricultural Economics* 72 (2): 434–441.

Dharmaratne, G.S., Sang, F.Y., and Walling, L.J. 2000. "Tourism potentials for financing protected areas." *Annals of Tourism Research* 27 (3): 590-610.

Eagles, P.F.J., McCool, S.F., and Haynes, C.D. 2002. *Sustainable tourism in protected areas: Guidelines for planning and management*. Cambridge: IUCN.

Englin, J., and Shonkwiler, J.S. 1995. "Estimating social welfare using count data models: an application to long-run recreation demand under conditions of endogenous stratification and truncation." *The Review of Economics and Statistics* 77 (1): 104-112.

Freeman, A.M. 2003. *The measurement of environmental and resource values: theory and methods*. Washington, DC: Resources for the Future.

Haab, T.C., and McConnell, K.E. 1997. "Referendum models and negative willingness to pay: alternative solutions." *Journal of Environmental Economics and Management* 32 (2): 251-270.

Hanemann, M.W., Loomis, J.B., and Kanninen, B.J. 1991. "Statistical efficiency of double-bounded dichotomous choice contingent valuation." *American Journal of Agricultural Economics* 73 (4): 1255-1263.

Hellerstein, D.M. 1991. "Using count data models in travel cost analysis with aggregate data." *American Journal of Agricultural Economics* 73 (3): 860-866.

Hellerstein, D.M. 1992. "The treatment of nonparticipants in travel cost analysis and other demand models." *Water Resources Research* 28 (8): 1999-2004.

Kanninen, B.J. 1993. "Optimal experimental design for double-bounded dichotomous choice contingent valuation." *Land Economics* 69 (2): 138-146.

Klein, R.J.T., Nicholls, R.J., and Mimura, N. 1999. "Coastal adaptation to climate change: Can the IPCC technical guidelines be applied?" *Mitigation and Adaptation Strategies for Global Change* 4 (3-4): 239-252.

Krinsky, I., and Robb, A.L. 1986. "On approximating the statistical properties of elasticities." *The Review of Economics and Statistics* 68 (4): 715-719.

Landry, C.E. 2005. *Recreational benefits of beach erosion control: a comparison of revealed and stated preference results*. East Carolina University, Department of Economics, Working Paper No. 0522. Accessed October 16, 2012. http://www.ecu.edu/cs-educ/econ/upload/ecu0522.pdf.

Landry, C.E., and McConnell, K.E. 2007. "Hedonic onsight cost model of recreation demand." *Land Economics* 83 (2): 253-267.

Leonard, G. 1993. Issues in the contingent valuation of environmental goods: methodologies for data collection and analysis. In Hausman, J.A. (ed.) *Contingent Valuation: A Critical Assessment (Contributions to Economic Analysis, Volume 220)*, Emerald Group Publishing Limited, pp.165-215.

Lindberg, K. 1998. Economic aspects of tourism. In Lindberg, K., Wood, M. E., and Engeldrum, D. (Eds.), *Ecotourism: A guide for planners and managers*, Vol. 2. North Bennington: The Ecotourism Society, pp. 87-117.

Logar, I. 2010. “Sustainable tourism management in Crikvenica, Croatia: An assessment of policy instruments.” *Tourism Management* 31 (1): 125-135.

Loomis, J. 2006. “A comparison of the effect of multiple destination trips on recreation benefits as estimated by travel cost and contingent valuation methods.” *Journal of Leisure Research* 38 (1): 46-60.

Mathieu, L.F., Langford, I.H., and Kenyon, W. 2003. “Valuing marine parks in a developing country: a case study of the Seychelles.” *Environment and Development Economics*, 8 (2), 373-390.

McConnell, K.E. 1992. “On-site time in the demand for recreation.” *American Journal of Agricultural Economics* 74 (4): 918-925.

McConnell, K.E., and Strand, I. 1981. “Measuring the cost of time in recreation demand analysis: An application to sportfishing.” *American Journal of Agricultural Economics* 63 (1): 153–156.

Mimura, N., and Kawaguchi, E. 1997. Responses of coastal topography to sea-level rise. In Edge, B.L. (Ed.), *Coastal Engineering 1996: Proceedings of the Twenty-Fifth International Conference*, Orlando, September 2-6. New York: American Society of Civil Engineers, pp. 1349-1360.

Mitchell, R.C., and Carson, R.T. 1989. *Using surveys to value public goods: The contingent valuation method*. Washington, DC: Resources for the Future.

Nicholls, R.J., and Hoozemans, F.M.J. 1996. “The Mediterranean: vulnerability to coastal implications of climate change.” *Ocean & Coastal Management* 31 (2-3): 105-132.

Nunes, P.A.L.D., and van den Bergh, J.C.J.M. 2004. "Can people value protection against invasive marine species? Evidence from a joint TC-CV survey in the Netherlands." *Environmental and Resource Economics* 28 (4): 517-532.

Parsons, G.R., and Wilson, A.J. 1997. "Incidental and joint consumption in recreation demand." *Agricultural and Resource Economics Review* 24 (1): 1-6.

Pearce, D.G., and Kirk, R.M. 1986. "Carrying capacity for coastal tourism." *Industry and Environment* 9 (1): 3-7.

Randall, A. 1994. "A difficulty with the travel cost method." *Land Economics* 70 (1): 88-96.

Reynisdottir, M., Song, H., and Agrusa, J. 2008. "Willingness to pay entrance fees to natural attractions: An Icelandic case study." *Tourism Management* 29 (6): 1076-1083.

Saengsupavanich, C., Seenprachawong, U., Gallardo, W.G., and Shivakoti, G.P. 2007. "Port-induced erosion prediction and valuation of a local recreational beach." *Ecological Economics* 67 (1): 93-103.

Shaw, D. 1988. "On-site sample regression: Problems of non-negative integers, truncation, and endogenous stratification." *Journal of Econometrics* 37 (2): 211–223.

Shivlani, M.P., Letson, D., and Theis, M. 2003. "Visitor preferences for public beach amenities and beach restoration in south Florida." *Coastal Management* 31 (4): 367-385.

Silberman, J., and Klock, M. 1988. "The recreation benefits of beach nourishment." *Ocean and Shoreline Management* 11 (1): 73-90.

Smith, V.K., Desvousges, W.H., and McGivney, M.P. 1983. "The opportunity cost of travel time in recreation demand models." *Land Economics* 59 (3): 259-278.

Smith, V.K. 1988. "Selection and recreation demand." *American Journal of Agricultural Economics* 70 (1): 29-36.

Strazzera, E., Genius, M., Scarpa, R., and Hutchinson, G. 2003a. “The effect of protest votes on the estimates of WTP for use values of recreational sites.” *Environmental and Resource Economics* 25 (4): 461-476.

Strazzera, E., Scarpa, R., Calia, P., Garrod, G.D., and Willis, K.G. 2003b. “Modelling zero values and protest responses in contingent valuation surveys.” *Applied Economics* 35 (2): 133-138.

Stručka, T. 2000. *OLS model fizičkih pokazatelja inozemnoga turističkog prometa na hrvatskom tržištu*. Zagreb: Croatian National Bank. Accessed October 10, 2012. http://www.hnb.hr/publikac/istrazivanja/i-007.pdf.

Ward, F.A., and Beal, D. 2000. *Valuing nature with travel cost models. A manual*. Cheltenham: Edward Elgar.

Whitehead, J.C., Haab, T.C., and Huang, J.C. 2000. “Measuring recreation benefits of quality improvements with revealed and stated preference data.” *Resource and Energy Economics* 22(4): 339-354.

Whitehead, J.C., Dumas, C.F., Herstine, J., Hill, J., and Buerger, B. 2008. “Valuing beach access and width with revealed and stated preference data.” *Marine Resource Economics* 23 (2): 119-135.

Whitmarsh, D., Northen, J., and Jaffry, S. 1999. “Recreational benefits of coastal protection: a case study.” *Marine Policy* 23 (4-5): 453-463.

Yeh, C.Y., Haab, T.C., and Sohngen, B.L. 2006. “Modeling multiple-objective recreation trips with choices over trip duration and alternative sites.” *Environmental and Resource Economics* 34 (2): 189-209.

Yepes, V. 1998. *Planificación y gestión turística de playas*. Actas del Curso sobre Gestión Integral de la Costa. Madrid: CEDEX.

Table 1. Characteristics of the beaches under study

Beach	Paid	Free
Texture	Sand	Pebble
Size	29,700 m^2	12,210 m^2
Available beach area per visitor[a]	4 m^2	4.1 m^2
Facilities	• Showers • Lifeguards • Children playground • Deckchair and sun-umbrellas for rent • Beach volleyball playground • Toilets • Bars and restaurants on the beach • Facilities for disabled • Recycling facilities • Sport facilities (table tennis, badminton, water sports)	• Showers • Lifeguards • Children playground • Deckchair and sun-umbrellas for rent • Beach volleyball playground

[a] In the peak season (July and August).

Source: Carić et al. (2007)

Table 2. Descriptive statistics for the free and the paid beach separately

		Beach	
		Free	**Paid**
Composition of visitors			
Town residents in the sample	(%)	1.8	1.8
Foreigners	Domestic visitors (%)	55.5	34.1
	Foreign visitors (%)	18.9	29.9
	Croatian, Bosnian and Serbian visitors who live abroad (%)	25.6	35.9
Town visit characteristics			
Number of previous visits		13.4	13.1
Days spent in the town		10.0	8.8
Main reason for visiting the town (first	Proximity of the destination (%)	29.2	21.7
answer choice)	I was here before and liked it (%)	25.8	24.4
	I have a second home in the town (%)	9.3	6.7
	Visiting friends or relatives (%)	9.9	7.6
	Nice beaches (%)	8.4	19.2
	Other (%)	17.4	20.4
Beach visit characteristics			
Reasons for choosing the particular beach	Proximity (%)	43.6	12.9
	Texture (%)	6.1	44.3
	Facilities (%)	5.5	23.7
	Free access (%)	5.5	0.0
	Other (%)	59.2	59.3
Level of satisfaction with the beach	Unsatisfied or very unsatisfied (%)	2.4	0.9
	Neutral (%)	14.3	10.5
	Satisfied or very satisfied (%)	83.3	88.6
Travel costs and expenditure data			
Number of persons in the travel group		2.9***	3.2***
Number of children in the travel group		0.6**	0.8**
Number of other destinations visited		0.6***	1.0***
Total days on the trip		12.3	13.0
Travel costs per day		€ 10.4***	€ 13.6***
Accommodation costs per night adult		€ 16.1***	€ 20.8***
Spending at the beach per day adult		€ 12.8	€ 14.0
Preferences for and evaluation of the beaches			
Preference of beach texture	Sand (%)	40.9	73.6
	Pebble (%)	37.2	10.5
	No preference (%)	21.9	15.9
Average beach score		4.0	4.2
Visited the other beach under study	(%)	57.0	51.8
Average score of the other beach		4.1	3.5
Attitude to beach entrance fee			
Knowing reasons for paying the fee	(%)	31.7	51.2
In favor of introducing a beach entrance fee to other beaches in Croatia and Europe (%)		63.4	76.4
Who should pay for beach maintenance	Local government (%)	48.3	33.9

	National government (%)	19.0	20.4
	Residents (%)	0.9	0.3
	Tourists (%)	3.4	4.8
	Beach users (%)	9.8	16.2
	All previous categories (%)	15.6	18.6
	Other (%)	3.0	5.8
Socio-economic characteristics of the visitors			
Gender	Male (%)	43.6	48.5
	Female (%)	56.4	51.5
Age		42.1***	37.7***
Education	Less than elementary school (%)	1.2	0.3
	Elementary school (%)	6.1	7.5
	Secondary school (%)	62.4	60.8
	College (%)	12.9	15.5
	Bachelor degree (%)	13.1	11.7
	Master degree or higher (%)	4.3	4.2
Employment	Working (%)	72.5	80.5
	Not working: comprising retired people, students, homemakers, and unemployed visitors (%)	27.5	19.5
Income		€ 1,843***	€ 2,325***

Note: ** and *** denote $p<0.05$ and $p<0.01$

Table 3. Bid cards and distribution of the WTP responses

Free beach

	Bid amounts			Proportion of responses (%)			
Version	Initial	Low	High	Yes-Yes	Yes-No	No-Yes	No-No
1	0.69€	0.41€	1.11€	18.0	5.5	0	2.4
2	1.11€	0.69€	1.94€	10.0	9.7	1.8	4.0
3	1.94€	1.11€	2.49€	9.5	4.9	4.3	7.3
4	2.49€	1.94€	3.32€	4.0	4.6	2.4	11.6

Paid beach

	Bid amounts			Proportion of responses (%)			
Version	Initial	Low	High	Yes-Yes	Yes-No	No-Yes	No-No
1	2.49€	1.94€	3.32€	8.4	9.9	4.8	3.3
2	3.32€	2.49€	4.15€	6.0	4.8	5.7	7.2
3	4.15€	3.32€	4.84€	4.5	3.3	2.4	14.6
4	4.84€	4.15€	6.92€	1.5	5.4	0.9	17.3

Table 4. WTP functions

	Paid beach model		**Free beach model**		**Pooled model**[a]	
Variable	Coefficient	Standard error	Coefficient	Standard error	Coefficient	Standard error
Equation 1						
Start bid	-0.512***	0.082	-0.973***	0.102	-0.534***	0.048
Reason for the town visit: nice beaches	0.495**	0.202	0.785*	0.414	0.669***	0.169
Level of satisfaction with the beach	0.241**	0.094	0.199**	0.086	0.217***	0.062
Agree with introducing the fee to other beaches	0.519***	0.184	0.426**	0.168	0.414***	0.126
Local government should pay for the costs	-0.382**	0.164	-0.444***	0.162	-0.402***	0.114
Household income (natural logarithm)	0.242**	0.109	-0.118	0.115	0.083	0.078
Age	-0.053	0.039	-0.099**	0.040	-0.064**	0.028
Age squared	0.001	< 0.001	0.001**	< 0.001	0.001**	< 0.001
Respondents who do not work	-0.351	0.226	-0.501***	0.184	-0.342**	0.148
Constant	0.772	1.070	4.854***	1.190	2.161***	0.821
Mean/median WTP	€3.35[b]		€2.08		n/a[c]	
95% Confidence interval	3.01 – 3.64		1.90 – 2.31			
Equation 2						
Follow bid	-0.513***	0.089	-0.762***	0.104	-0.456***	0.044
Reason for the town visit: nice beaches	0.175	0.182	0.730***	0.273	0.359**	0.149
Level of satisfaction with the beach	0.215**	0.088	0.124	0.078	0.148**	0.060
Agree with introducing the fee to other beaches	0.427**	0.171	0.580***	0.148	0.520***	0.115
Local government should pay for the costs	-0.568***	0.152	-0.348**	0.141	-0.426***	0.105
Household income (natural logarithm)	0.284***	0.101	-0.012	0.094	0.167**	0.070
Age	-0.025	0.035	-0.092***	0.033	-0.049**	0.023
Age squared	<0.001	< 0.001	0.001**	< 0.001	<0.001*	< 0.001
Respondents who do not work	-0.121	0.202	-0.350**	0.170	-0.193	0.137
Constant	-0.141	1.025	3.345***	1.058	0.815	0.729
Mean/median WTP	€2.92[b]		€1.84		n/a	
95% Confidence interval	2.39 – 3.25		1.64 – 2.03			
ρ (1,2)	0.702***		0.911***		0.699***	
Log pseudolikelihood	-351.482		-333.763		-703.956	
Wald χ^2 (df=18)	112.17***		150.35***		219.25***	
Pseudo R^2	0.191		0.198		0.193	
Number of observations	317		315		632	

Notes: *, ** and *** denote $p<0.1$, $p<0.05$ and $p<0.01$. Calculations are performed with STATA 11

[a] The beach indicator variable was not included in the pooled model because of 1) high correlation with the start and the follow bid variables (r=0.804 and r=0.709, respectively), which would result in multicollinearity, and 2) to make it consistent with the other two models. The start and the follow bid variables thus capture a large part of variation between the two beaches.

[b] This welfare measure includes the current beach entrance fee of €1.66. Therefore, the mean/median WTP for preventing beach erosion is estimated by deducting this fee. The resulting WTP estimates equal €1.69 (€1.26) based on the first (second) valuation question.

[c] Not applicable

Table 5. Travel cost recreation models

	PAID BEACH		**FREE BEACH**	
Variable	Coefficient	Standard error	Coefficient	Standard error
Travel costs and characteristics				
Travel costs	-0.019***	0.004	-0.038***	0.006
Multiple-destination trip	-0.209	1.030	-0.388	1.066
Multiple-destination trip*Travel costs	-0.005	0.009	0.013	0.011
Site characteristics (quality levels: very good)				
Beach cleanliness	-0.254	0.569	0.102	0.681
Sea water cleanliness	-1.255**	0.576	-0.637	0.722
Density of people at the beach	-1.696**	0.776	-1.308*	0.712
Quietness	-0.177	0.699	0.537	0.688
Landscape	-0.388	0.464	0.399	0.437
Socio-economic characteristics				
Female	-0.308	0.413	-0.380	0.406
Age	-0.049***	0.016	-0.034**	0.014
Income	0.001	0.021	0.062***	0.022
Years of education	0.012	0.094	0.044	0.079
Respondents who work	-0.424	0.447	-1.723***	0.437
Constant	4.683***	1.313	3.163***	1.145
Dispersion parameter (α)	2.972***	0.627	3.600***	0.769
Log likelihood	-191.358		-200.847	
Likelihood-ratio stat. (df=15)	138.90***		118.23***	
Pseudo R^2	0.2663		0.2274	
Number of observations	321		317	

Notes: *, ** and *** denote p<0.1, p<0.05 and p<0.01. Calculations are performed with STATA 11

Table 6. Overview of results

CVM results		Initial bid	Follow-up bid
Paid beach	WTP per adult per day for preventing beach erosion	€ 1.69	€ 1.26
	Total value of preventing beach erosion per year	€ 286,078	€ 213,289
	Share of beach maintenance cost in total value	105.22%	141.12%
Free beach	WTP per adult per day for preventing beach erosion	€ 2.08	€ 1.84
	Total value of preventing beach erosion per year	€ 171,858	€ 152,028
TCM results		**Mean value**	
Paid beach	Consumer surplus per adult per day	€ 2.57	
	Total beach use value per year	€ 435,042	
	Share of beach maintenance cost in total value	69.19%	
Free beach	Consumer surplus per adult day	€ 1.74	
	Total beach use value per year	€ 143,766	