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# Are preferences for water quality different for second-home residents?

Catalina M. Torres

*Centre de Recerca Econòmica (UIB·SA NOSTRA) and Departament d'Economia Aplicada, Universitat de les Illes Balears, Ctra Valldemossa, km 7.5, 07122 Palma de Mallorca, Spain. E-mail: cati.torres@uib.es.*

Antoni Riera

*Centre de Recerca Econòmica (UIB·SA NOSTRA) and Departament d'Economia Aplicada, Universitat de les Illes Balears, Palma de Mallorca, Spain. E-mail: antoni.riera@uib.es.*

Dolores García

*Departament d'Economia Aplicada, Universitat de les Illes Balears, Palma de Mallorca, Spain. E-mail: dolores.garcia@uib.es.*

The latest trends in tourism indicate the emergence of a new segment of visitors looking for accommodation in private residences. The increase in second-home residents has led to efforts to improve knowledge of the preferences of this new type of tourist in those destinations where their presence is considerable. As one of the key variables affecting the choice of residential tourists is the environmental quality of the area, this paper focuses on testing for the existence of an inverse correlation between the loss of coastal water transparency, viewed as a measure of environmental quality, and beach aesthetics in Santa Ponça Bay, a Mallorcan coastal area containing two urban beach zones of intensive recreational use, where the proportion of second-home residents is high. The results show that the willingness to pay for improvements in water transparency diminishes in a non-linear way when transparency deteriorates, resulting in no statistically significant differences between first- and second-home residents.

*Keywords*: choice experiments; preference heterogeneity; coastal water quality; second-home residents; Spain

*JEL classification*: C9, C35, C42, Q51, Q53, Q57

Over the past few decades, the production of services has become the biggest production activity in the world, representing in 1998 around 60% of the world's gross domestic product (GDP).[1] In this context, tourism services have acquired a considerable weight, showing a growth rate much higher than that of the economy as a whole (Smeral, 2003). This is particularly true in the Balearic Islands, where the production of services represents 81.6% of the GDP, of which one-third is related directly and indirectly to tourism activities (Riera *et al*, 2007).

The contribution of travel and tourism to the world's GDP is expected to rise from 9.9% (US$5,890 billion) in 2008 to 10.5% (US$10,855 billion) by 2018. However, the effects derived from the process of globalization, the decrease in transport costs and the emergence of new destinations can make the distribution of the expected tourism growth uneven at the regional level, thus increasing competitiveness among tourism regions. Within the process of transformation of the tourism sector, the preference for more trips, but shorter ones, the penetration of the Internet, the increase in direct bookings and the major weight of low cost companies demonstrate the emerging global trends leading to a new concept of tourism demand. In this context, the rise in the percentage of visitors looking for accommodation in private residences is not negligible. Thus, 22.9% of tourists travelling to the Balearic Islands in 2007 stayed in establishments other than hotels.[2] Holidaymakers enjoying this type of accommodation, or second-home residents, present some specific and homogeneous features, such as longer lengths of stay (up to 18 days for those staying in their own residence), higher repeat visitation rates and the fact that they tend to be older than other types of tourists. Nowadays, this phenomenon, almost unperceivable until the mid-1990s, constitutes one of the main characteristics of the latest stage in expanding tourism in the Balearic Islands, known as the 'Third Tourism Boom' (Blázquez *et al*, 2002). Proof of this is given by the higher proportion of second residences in the archipelago (199.6 residences/1,000 inhabitants) with respect to the rest of Spain (170.8 residences/ 1,000 inhabitants).[3]

The attractiveness of the destination's natural resources is viewed as one of the main factors contributing to the increase in residential tourism. Indeed, the environmental quality of the area is one of the key variables affecting tourists' choice of buying or renting a holiday home (Aguiló, 1999). Thus, knowing tourists' preferences for environmental quality issues becomes of paramount importance in tourism destinations. In this framework, elicitation of the economic value of the recreational services provided by ecosystems and, consequently, the economic welfare of recreationists, represents one of the challenges for environmental economics. This is especially of concern in coastal tourism areas where seawater quality is one of the key variables affecting visitors' travel choices.

Given that one of the most commonly used water quality indicators in the literature is water clarity (Boyle *et al*, 1999; Koteen *et al*, 2002), this article is focused on testing for the existence of an inverse correlation between the loss of water transparency and beach aesthetics in Santa Ponça Bay, a Mallorcan coastal area containing two urban beach zones of intensive recreational use characterized by recurrent microalgal blooms during summer and where the proportion of second-home residents is very high. Because stated preference (SP) methods are viewed as the most suitable ones for measuring values when people have not made choices in response to different water quality states in the past, the choice experiment (CE) has been applied. Its design requirements involving


**Figure 1.** Santa Ponça watershed.
*Source*: Adapted from an original map by IMEDEA.

the construction of different choice sets with a specific number of different scenarios, in which distinct characteristics of the marine ecosystem can be valued separately, make this valuation technique the most appropriate one.

The structure of this paper is as follows. In the next section, the study area is defined with an outline of the algal bloom problem. The subsequent section describes the theoretical foundations for the treatment of data collected from CEs. Then the main stages of the survey design procedure are explained and descriptive statistics and estimation results are presented. The final section offers conclusions from the results.

## Study area definition

Santa Ponça Bay is a small protected embayment located on the southern coast of Mallorca in the council of Calvià. It stretches 44.6 km from Cap Negret to Cap Andritxol and its coastline is dominated by rocky shores and stretches of sandy areas. The bay's watershed (Figure 1) has a total area of 107 km$^2$ and goes from the coast to the start of the western Serra de Tramuntana mountain range. The majority of the drainage basin is undeveloped (61%) and protected by law (ANEI), being land dedicated to agricultural use (31%) partially protected by ARIP regulation (up to 81%).[4] The Santa Ponça-I, -II and -III golf courses, which represent 1% of recreational land use, are located to the south, near the beach of Santa Ponça.

The fact that urban occupation is devoted mainly to tourism explains that, although urban use (7%) is distributed throughout the watershed, the population is especially concentrated in the coastal areas of Peguera (19%) and Santa Ponça (48%).[5] Over the years, the coastline of the bay has experienced much human pressure due to the development of tourism based on sun, sand and sea. Since the beginning of the tourism expansion of the Balearic Islands in the mid-20th century, tourists have looked mainly for sandy beaches and their coves, so hotel construction and all other forms of development and use have placed demands on the archipelago's natural areas, mainly the coastal zones (Riera, 2000). In this context, Santa Ponça and Peguera have become two urban beach areas of intensive recreational use, especially in the summer when the occupancy rates of the available hotel beds range from 89.8% to 98.9%[6] and the number of second-home residents on holiday is considerable (62.3% and 64.2%, respectively).[7]

As a result of tourism development, the main part of Santa Ponça's rocky shore has suffered enormous modification and much of its stretch has been covered by hotels, housing developments and coastal infrastructures. In addition, there are former quarries of sandstone, limestone and gypsum. Likewise, the majority of sandy beaches do not have the beach–dune system that is a common feature of undisturbed Mallorcan beaches. One of the current environmental concerns of the bay's stakeholders involves the increase in water demand brought about by seasonal coastal tourism and the needs of hotels and apartments, swimming pools and golf courses, as well as the personal water use of visitors.[8] This rise in water consumption has led to an increase in the activity of the urban wastewater treatment plants in the watershed and hence in the emission of nutrients through the treated wastewater flows that are carried out to sea by underwater pipes. This phenomenon contributes to phytoplanktonic proliferations, viewed as a potential indicator of coastal water degradation due to the allochthonous contribution of inorganic nutrients, which usually change some of the features of the water itself. Microalgal blooms have the potential to decrease the welfare of coastal water users. Although there is no evidence of effects on human health and the marine ecosystem, they are easily perceptible, especially through the loss of water transparency and the change in water colour. These negative effects on water quality will allegedly increase with the duration of the episodes and with their intensity, or greater loss of transparency. In this framework, beach users and non-users could be affected by their presence, potentially leading to a loss in the economic benefits gained from the Santa Ponça coastal resources.

## Methodology

SP methods constitute the most common way of estimating the value of environmental externalities (Louviere *et al*, 2000). Usually, these methods imply the simulation of a market where a good, or a bundle of goods, is offered at a given price, although other variants are possible. The simulated market is described in a questionnaire given to a sample of the relevant population. Respondents 'state' their preferences and practitioners apply a statistical procedure to estimate their representative maximum willingness to pay (WTP). CEs are the most popular among the subgroup of choice modelling methods (Bateman *et al*, 2002). In choice modelling, people are presented with several alternatives, each one being described by a number of attributes or characteristics (Bennett and Blamey, 2001). When respondents are asked to state their most preferred alternative from the choice set, a CE is undertaken. Compared to the contingent valuation method, CEs allow the valuation of distinct attributes or characteristics describing the good considered. Under some assumptions, practitioners can use these marginal values to assess discrete changes. Some authors believe that CEs are best for measuring marginal values or relatively small discrete changes (Hanley *et al*, 1998b, 2001).

CEs have been widely applied to value environmental goods (Boxall *et al*, 1996; Adamowicz *et al*, 1997, 1998; Bullock *et al*, 1998; Hanley *et al*, 1998a,b, 2002; Rolfe *et al*, 2000; Morey *et al*, 2002; Scarpa *et al*, 2003; Riera and Mogas, 2004; Christie *et al*, 2006; Colombo *et al*, 2006; Jin *et al*, 2006). Studies concerned with the valuation of marine amenities are less abundant (Machado and Mourato, 2002; Stoltel *et al*, 2003). In some papers, water quality or appearance has been one of the valued attributes (Adamowicz *et al*, 1994; Hanley *et al*, 2006).

## *Statistical analysis of individual choice data*

The choice context faced by respondents in CEs can be characterized by random utility maximization (RUM) models (Thurstone, 1927; McFadden, 1974). Individual choice behaviour based on maximizing utility assumes that the utility individuals obtain from different combinations of attributes can be decomposed in a deterministic component ($V_j$) and a random one ($\varepsilon_j$). Thus,

$$U_j = V_j(X_j, p_j; \beta) + \varepsilon_j, \tag{1}$$

where $U_j$ is the indirect utility associated with alternative $j$; $X_j$ is a vector of attributes associated with profile $j$; $p_j$ is the cost of the alternative $j$; $\beta$ is a vector of preference parameters; and $\varepsilon_j$ is the random error term reflecting the researcher's uncertainty about the individual's choice. In choice problems specified by RUM models, it is supposed that the respondent maximizes his or her utility and hence, after evaluating each and every alternative in the choice sets, chooses the alternative $j$ that gives him or her the highest utility level. The stochastic term in the utility function allows the explanation of choices in terms of probabilities. In this sense, the probability that a respondent chooses a particular alternative $j$ from among $C$ alternatives can be expressed as

$$P(j|C) = P(U_j > U_k) = P(V_j + \varepsilon_j > V_k + \varepsilon_k), \ \forall k \subset \mathrm{C}, \tag{2}$$

or expressed in terms of utility differences as

$$P(j|C) = P(V_j - V_k > \varepsilon_k - \varepsilon_j), \ \forall k \subset \mathrm{C}, \tag{3}$$

If errors are assumed to follow a type 1 extreme value (Gumbel) distribution, then the choice model corresponds to the conditional logit (CL) model, also called multinomial logit, as developed by McFadden (1974). Then, the choice probability can be written as

$$P(j|C) = \frac{e^{\omega V_j}}{\sum_{k \in C} e^{\omega V_k}} \,, \tag{4}$$

where $\omega$ is the scale parameter, which can be assumed to be 1. The likelihood function is

$$L = \prod_{i=1}^{N} \prod_{j \in C} P(j|C)^{y_{ji}} \,, \tag{5}$$

where $i = 1,...,N$ indexes $N$ respondents; $y_{ji}$ is a dummy variable taking value 1 if respondent $i$ chooses alternative $j$ and 0 otherwise; and $P(j|C)$ corresponds to the expression of the probability of choosing alternative $j$, as in (2).

The CL model is estimated by finding the values of the $\beta$ parameters maximizing the following log-likelihood function

$$\ln L = \sum_{i=1}^{N} \sum_{j \in C} y_{ji}(V_j - \ln \sum_{k \in C} \exp(V_k)). \tag{6}$$

Once the parameters have been estimated, marginal values can be found by simply computing the negative of the marginal rate of substitution between a particular attribute and the cost attribute. Given the assumption that utility is linear in parameters, the marginal value of attribute $z$ would simply be

$$-\frac{\beta_z}{\beta_{cost}} \,, \tag{7}$$

where $\beta_z$ and $\beta_{cost}$ are, respectively, the coefficients preceding the $z$ and cost attributes in the utility function.

When interaction effects are considered, the marginal value of a particular attribute depends on the level of other interacting attributes. Thus, if $z$ and $n$ interact, being $\beta_{zn}$ the estimated parameter corresponding to such interaction, and $X_n$ the particular level of attribute $n$, the marginal value of $z$ would now be given by the expression

$$-\frac{\beta_z + \beta_{zn} X_n}{\beta_{cost}} \,. \tag{7}$$

The previous theoretical setting underlies the particular CE undertaken to estimate values associated to changes in the beach environment of Santa Ponça Bay. In the exercise, the particular attributes defining the alternatives are the loss of water transparency ($X_{losstransp}$) and the duration ($X_{dur}$) of the algal bloom; the level of congestion ($X_{cong}$) at the beach; and, finally, a payment or cost attribute ($X_{cost}$) required to implement the programme under consideration. These four attributes enter the deterministic part of the utility function indicated in (1). Also, as will be explained in the section on survey outputs, some interaction effects have been considered. The transparency, duration and congestion attributes are treated as dummy-coded variables:[9]

$$V_j = \beta_{losstransp\_l}X_{losstransp\_l} + \beta_{losstransp\_m}X_{losstransp\_m} + \beta_{dur\_l}X_{dur\_l} + \beta_{dur\_m}X_{dur-m} +$$
$$+ \beta_{cong\_l}X_{cong\_l} + \beta_{cong\_h}X_{cong\_h} + \beta_{cost}X_{cost} + \beta_{(losstransp\_l)(dur\_l)}X_{losstransp\_l} \cdot X_{dur\_l} +$$
$$+ \beta_{(losstransp\_m)(dur\_l)}X_{losstransp\_m} \cdot X_{dur\_l} + \beta_{(losstransp\_l)(cong\_l)}X_{losstransp\_l} \cdot X_{cong\_l} +$$
$$+ \beta_{(losstransp\_l)(cong\_h)}X_{losstransp\_l} \cdot X_{cong\_h} + \beta_{(cong\_h)(dur\_l)}X_{cong\_h} \cdot X_{dur\_l} +$$
$$+ \beta_{(cost)(second\_ho)}X_{cost} \cdot X_{second\_ho} \tag{9}$$

where subscripts $h$, $m$ and $l$ refer to high, medium and low levels, respectively.

Given the previous specification, the estimated marginal value associated with shifting to a scenario of low water transparency loss is calculated as

$$-\frac{\beta_{losstransp\_l} + \beta_{(losstransp\_l)(dur\_l)}X_{dur\_l} + \beta_{(losstransp\_l)(cong\_l)}X_{cong\_l} + \beta_{(losstransp\_l)(cong\_h)}X_{cong\_h}}{\beta_{cost} + \beta_{(cost)(second\_ho)}X_{second\_ho}}$$

## Survey design

A survey instrument based on the CE technique was designed for implementation in Santa Ponça Bay. The initial steps of the study were to define the choice alternatives and identify their relevant attributes. Given the current situation of algal blooms in Mallorca, and according to experts in marine ecosystems, the main impact of algal blooms corresponds to a loss of coastal water transparency in the summer time. Two attributes defining these phenomena, loss of water transparency and the duration of the bloom, were considered as central to the choice decision. The alternatives proposed in the CE exercise included the combination of different levels of these two attributes, together with congestion and a payment. Table 1 shows the four attributes with their varying levels.

The choice of these attributes and levels was the result of discussions with experts, especially with respect to the loss of water transparency and the duration of the bloom corresponding to the business-as-usual (BAU) scenario.[10] One focus group session was conducted with residents from the study area. They were paid €50 for their collaboration. Focus group participants found the levels used to be credible and their description through text and pictures understandable.[11] As for the cost attribute, the price vector used was adjusted after the pilot survey had been undertaken. The payment vehicle was a mandatory tax that all households would pay to fund the start of a project to improve the wastewater treatment system. The payment would be collected through the tap water bill, paid every two months, and would be removed after one year.

Given the number of attributes and their levels, there is a universe of $(3^3 \times 6) \times (3^3 \times 6)$ possible pairs of combinations. Following a fractional factorial design (Louviere, 1988), 54 profiles were generated; this number being the smallest orthogonal design allowing for the estimation of all main and two-way interactions. The profiles were paired randomly and some attribute levels were modified in order to improve the efficiency of the CE by means of

**Table 1. Attributes and levels used in the choice sets.**

| Attribute | Description | Levels |
|---|---|---|
| Loss of transparency | Loss of water transparency (in percentages) | 20 (low)<br>40 (medium)<br>60* (high) |
| Duration | Duration of the bloom (in weeks) | 3<br>6<br>8* |
| Congestion | Distance to the nearest person or group of people (in metres) | Less than 3 (high)<br>Between 3 and 20 (medium)*<br>More than 20 (low) |
| Payment | Household payment every two months during one year (in 2006 euros)<br>(BAU: 0 euros) | 3, 6, 9, 12, 18, 24 |

*Note*: *BAU – business-as-usual alternative.

balancing the utility provided by the different alternatives (Huber and Zwerina, 1996). The final design consisted of 28 pairs of attribute combinations, blocked into 7 versions of 4 choice sets of 2 alternatives plus the BAU option.[12] In this way, there were a total of 7 questionnaire versions, each one assigned randomly to a subsample out of a larger sample of respondents.[13]

The questionnaire was structured in four different sections. In the first section, the initial questions investigated the type and characteristics of the residency of respondents in order to classify them between first- and second-home residents. Then, they were asked about their usual recreational activities on the coast and the number of times they had visited the different coastal sites of the study area during the past month, as well as the main activity they had carried out in each of them. More specifically, the list of the 14 coastal sites considered was: Península de Cap Andritxol, Cala Fornells, Aigües Blaves, the beaches of Palmira, Torà and La Romana, and Sa Punta des Gats in Peguera; Cala Blanca and Punta des Castellot in Costa de la Calma; and the beach of Santa Ponça, Caló d'en Pallisser, Sa Caleta/Club Nàutic, Mirador des Malgrat/ Can Negret and Punta Prima in Santa Ponça. In the second section, the presence of algal blooms in the coastal waters was explained, with a description of their effects and the possibility of undertaking projects capable of improving or remedying the problem. The third section was devoted to preference elicitation questions, in which four choice sets were presented to individuals. Respondents were requested to choose the best alternative of every choice set. Follow-up questions were included to find out about potential protest behaviour, the difficulty of the exercise and the relative importance of the attributes present on the choice cards. The last and fourth section contained some socio-economic questions to obtain information about the respondents.

With respect to data collection, residents from Peguera, Costa de la Calma and Santa Ponça formed the sampling frame. The questionnaire was administered through in-person individual home interviews of the population

**Table 2. Type of residence.**

| | Population data | | Sample data | |
|---|---|---|---|---|
| First-home residents | 3,940 | 37.2% | 483 | 75.6% |
| Second-home residents | 6,656 | 62.8% | 156 | 24.4% |
| Total | 10,596 | 100% | 639 | 100% |

**Table 3. Socio-demographics of survey respondents.**

| | Population data | | Sample data | |
|---|---|---|---|---|
| Males | 3,911 | 50.0% | 296 | 46.3% |
| Females | 3,911 | 50.0% | 343 | 53.7% |
| 18 < age < 65 | 7,254 | 92.7% | 572 | 89.5% |
| Age > 65 | 568 | 7.3% | 67 | 10.5% |

of 18 years of age or older, following random survey routes. A pilot survey was conducted during the last week of July 2006 amongst 60 respondents drawn randomly. The final survey was carried out from August to September 2006. Sample size was obtained by considering a confidence interval of 95% and a sample error of 4.6%, which gave a number of 430, and 1,669 household addresses were drawn randomly, which finally led to 639 resident interviews, the response rate being 38.3%.

## Survey outputs

### *Descriptive statistics*

To judge the representativeness of the sample in terms of first- and second-home residents, data from the *2001 Census of Population and Residences* from the Ibestat were used.[14] According to Table 2, sample data show a higher proportion of first-home residents. However, the actual figures present a percentage of second-home residents that exceeds first-home individuals, which is in line with the tourism nature of the study area.

As said earlier, sample individuals were chosen by selecting 1,669 household addresses at random, but no one was at home in 854 of them. Then, there were 51.2% of unsuccessful attempts that, in the light of the results from Table 2, affected mostly second-home residents.

The main socio-demographic features of the sample interviewed are shown in Table 3. Data regarding residence characteristics showed that individuals had lived in the area a mean of 13.3 years. The country of origin of most of them was Spain (75.3%), although the number of residents from EU member states was not negligible (23.3%). The average age of the sample was 45.11 years old and it was composed of a slight majority of females. They were well educated and had an average after-tax monthly household income of €2,940.85. With respect to occupation levels, 46.6% were employed, 17.1% self-employed, 2.5% unemployed, 11.9% retired, 5% students and 16.9% housewives. Family structure was formed mostly of households with children (61.8%) and with two or less children (90.2%), whereas only 5% of respondents were single. Only 2.8% of the sample was a member of an environmental organization, but the majority showed a preference for recycling (67.4%) and almost half for organic products (44.3%). On the other hand, 16.1% of individuals contributed to non-governmental organizations (NGOs).

The results indicated that almost all the people went swimming (96.2%). Sunbathing (64.5%) and walking (64.3%) also constituted popular beach activities, followed by viewing (48.4%). The remaining activities were not so common.

### *Choice experiment results*

In order to estimate the values of the attributes of a beach trip, the database was cleaned. Apart from missing responses, the choices of respondents who did not want to finish the interview, showed little cooperation or were not sincere according to the interviewers were excluded. Similarly, those who protested against some aspect of the questionnaire were not considered for the valuation of beach attributes. Protests about the valuation questions were present in 96 observations, representing 15% of the total population sampled.[15] After all the aforementioned rejections, 433 observations out of the original 639 remained valid for estimation purposes.

As explained above, the attributes included in the choice sets were loss of water transparency, duration, congestion at the beach and cost. Following the choices made by the individuals, some debriefing questions were included. Around 20% of respondents declared having found the choice exercise difficult or very difficult and about 51% declared having paid attention to all the characteristics when making their choices. The attribute ranked first, according to the importance given by the respondent, was transparency, with almost 81%, followed at a distance by the payment attribute (12.4%). The duration and congestion attributes seemed to have received little attention.

The cost attribute was treated as a continuous variable and the particular levels defining each profile entered the log-likelihood function directly. Water transparency loss, duration and congestion were treated as categorical variables. Specifically, two dummy-coded variables were created for transparency loss, two for duration and two for congestion, being the omitted levels high loss of transparency, high duration and medium congestion, respectively. This dummy-coding scheme allows testing for non-linearities in the valuation function.[16]

To investigate the role of the different attributes on the choice decisions of respondents, several specifications of the utility function can be made. A CL model was specified, including the attributes in the terms just explained and considering all the main effects and some selected second-order effects. The underlying utility function was built up from that in (1). Additionally, an alternative specific constant (ASC) and five two-way interactions were added: two between low or medium water transparency loss and low duration, two between low or high congestion and low transparency loss, and high congestion with low duration. The inclusion of these interactions can be justified. Thus, it seems reasonable to assume that the amount respondents may be willing to pay for an improvement in water transparency depends on the duration of the bloom episode. Likewise, and taking into account the importance of congestion issues in Santa Ponça Bay during summer, information about how congestion levels can affect preferences on low transparency loss and low duration is also policy relevant. These potential relationships were in any case tested in the estimated model. Besides, a final interaction between cost and a binary variable capturing whether the respondent was a second-home resident or not was included. Since the proportion of first- and second-home residents in the population was not captured adequately in the sample, a weighting variable was used in the estimation of the model to compensate for this. By means of this weighting variable, first-home observations, which were over-represented, were penalized, while second-home observations were given a higher weight. The results for such specification are shown in Table 4.

According to this specification, figures show that all variables turned out to be significant. The negative and significant sign of the ASC, which is a dummy variable that equals 1 when the BAU was not chosen, reveals that the utility associated with moving away from the BAU situation significantly decreased. This could be a kind of status quo bias, in which case this work is another example of this common economic phenomenon.[17] Looking now at the main effects, low and medium water transparency loss, low and medium duration, low and high congestion and the cost attribute were significant and showed the expected signs. Thus, the chance of choosing an alternative increased when it included a low or medium transparency loss, a low or medium duration of the bloom or a low congestion scenario, and decreased with a high congestion and the cost of the programme.

With respect to second-order effects, positive signs were found for the interactions between a low water transparency loss or a low duration of the bloom and a high congestion. This implied that both the value that respondents gave to enjoying a good transparency level and the value assigned to a low duration scenario increased when congestion at the beach was high. In other words, high congestion complemented both low transparency loss and low duration. Regarding the interactions between low or medium transparency loss and low duration, negative signs were found, suggesting they behaved as substitutive attributes for respondents. The same behaviour pattern was found for the interaction between low transparency loss and low congestion, the former being more valued when congestion was not low. Finally, the interaction term discriminating those who were second-home residents was significant at 5%.[18]

The values corresponding to the WTP for each attribute, or implicit prices, were calculated out of the coefficients in Table 4. A summary of the results is presented in Table 5 for second-home residents.[19] Given the interactions considered, the levels of some attributes needed to be determined first. In this sense, the levels corresponding to the BAU situation were the chosen ones, which involved considering a change from the BAU scenario to a new one in which only the attribute of interest changed to the level being valued, keeping the levels of the remaining attributes constant. Put another way, the value of each attribute level was computed as the negative of the ratio between its

**Table 4. CL model, with interactions.**

| Variable (attribute) | Coefficient | (*t*-ratios) |
|---|---|---|
| ASC | –0.334* | (–38.848) |
| Low water transparency loss | 3.642* | (18.458) |
| Medium water transparency loss | 2.678* | (15.971) |
| Low duration | 1.650* | (10.201) |
| Medium duration | 0.219*** | (1.839) |
| Low congestion | 0.747* | (4.936) |
| High congestion | –1.632* | (–8.823) |
| Cost | –0.124* | (–12.993) |
| (Low water transparency loss)*(Low duration) | –2.230* | (–8.196) |
| (Medium water transparency loss)*(Low duration) | –1.809* | (–5.881) |
| (Low water transparency loss)*(Low congestion) | –0.982* | (–3.902) |
| (Low water transparency loss)*(High congestion) | 0.579** | (2.228) |
| (High congestion)*(Low duration) | 1.776* | (6.872) |
| (Second-home resident)*(Cost) | 0.021** | (2.428) |
| Log-likelihood function: –1,213.663<br>Pseudo-$R^2$: 0.29<br>Observations: 1,732 | | |

*Note*: *Significant at 1% level; **significant at 5% level; ***significant at 10% level.

**Table 5. Bimonthly WTP of second-home residents for the attribute levels and 95% confidence intervals (CI).**

| Attribute | Marginal WTP[a] | |
|---|---|---|
| Low water transparency loss | 35.42 | [27.79–53.04] |
| Medium water transparency loss | 26.05 | [16.70–34.29] |
| Low duration | 16.04 | [8.32–21.20] |
| Medium duration | 2.13 | [(–2.91)–7.12] |
| Low congestion | 7.26 | [0.52–12.07] |
| High congestion | –15.87 | [(–17.19)–(–2.53)] |

*Note*: [a]Values in 2006 euros/respondent.

estimated parameter and the parameter of the cost attribute, as indicated in (7), thus representing a welfare variation with respect to the BAU situation caused by a change in the attribute.

As shown in Table 5, the WTP of second-home residents for changes in the level of transparency was, as expected, greater for a low transparency loss (€35.42) compared to a medium transparency loss (€26.05). Likewise, they posed a higher value for a low duration scenario (€16.04) than for a medium one (€2.13). On the other hand, while a low congestion level was valued

**Table 6. Bimonthly WTP of second-home residents for improvements in water transparency, in terms of congestion.**

| Congestion level | Marginal WTP[a] Low transp. loss (20%) | Marginal WTP[a] Medium transp. loss (40%) |
|---|---|---|
| Low congestion | 25.87 [16.43–36.81] | 26.05 [16.70–34.29] |
| Medium congestion | 35.42 [27.79–53.04] | |
| High congestion | 41.05 [25.77–56.30] | |

*Note*: [a]Values in 2006 euros/respondent.

positively by second-home residents (€7.26), results reflected that they should be compensated for accepting a high congestion scenario (€–15.87). For each attribute, level values differed significantly at the 5% level, thus indicating that the values did not vary linearly with changes in the attributes.

Looking at the value of water visibility in scenarios different from the BAU alternative, and taking into account the nature of tourism of Santa Ponça Bay and hence the importance of congestion issues for policymaking, the WTPs of second-home residents for enjoying a low and medium level of water transparency loss in terms of different congestion levels at the beach, and for a high or medium duration scenario, are shown in Table 6.

Results show that the WTP to improve visibility in the coastal water to a low level of transparency loss increased with congestion, being €25.87 in a low congestion context, €35.42 when congestion was medium and €41.05 for high congestion scenarios. This captures the before-mentioned idea of substitutability (complementarity) between low transparency loss and low congestion (high congestion). However, differences in WTP for achieving a low loss of transparency were not statistically significant at the 5% level when congestion was medium or high. On the other hand, WTP for passing to a medium level of transparency loss did not depend on congestion, the constant value being €26.05. Interestingly, the WTPs for a low and medium level of transparency loss were not statistically significantly different at the 5% level when congestion was low. Put another way, for medium and high congestion contexts, WTPs did not decrease linearly with transparency loss. Figure 2 illustrates these results.

All the marginal values reported in Tables 5 and 6 and Figure 2 referred to a base level that assumed that the respondent was in his or her second home. Since this feature entered the specification of the CL model, it affected the marginal utility of money, and thus the marginal values of all attributes. Considering water transparency values for first-home residents led to adjustments of the WTP. These adjusted WTPs are shown in Table 7.

According to the results, having a first home decreased the WTP by €5.98 for a low level of transparency loss and by €4.4 for a medium loss of transparency. As seen in Table 7, the remaining attribute levels were also less valued by first-home residents. Thus, they assigned €2.71 less to the low duration level and €0.36 less to the medium one. The value of low congestion

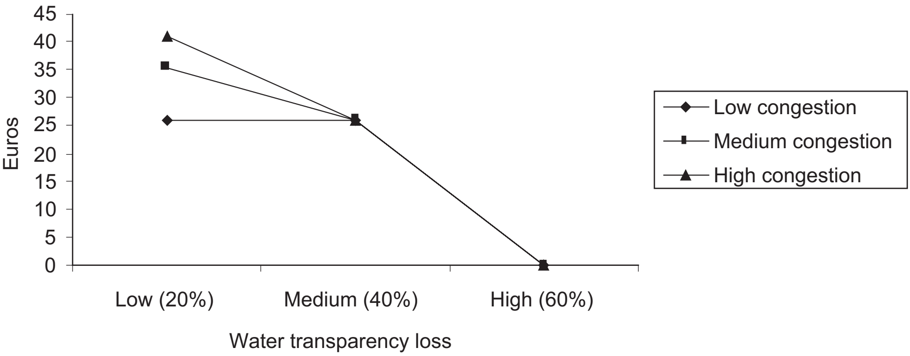


**Figure 2.** Bimonthly WTP of second-home residents for improvements in water transparency in relation to congestion.

**Table 7. Bimonthly WTP of first-home residents for the attribute levels and 95% CI.**

| Attribute | Marginal WTP[a] | |
|---|---|---|
| Low water transparency loss | 29.44 | [28.42–44.73] |
| Medium water transparency loss | 21.65 | [16.66–29.26] |
| Low duration | 13.34 | [8.28–18.42] |
| Medium duration | 1.77 | [(–2.48)–6.33] |
| Low congestion | 6.04 | [0.64–10.65] |
| High congestion | –13.19 | [(–15.20)–(–2.62)] |

*Note*: [a]Values in 2006 euros/respondent.

**Table 8. Bimonthly WTP of first-home residents for improvements in water transparency, in terms of congestion.**

| Congestion level | Marginal WTP[a] Low transp. loss (20%) | Marginal WTP[a] Medium transp. loss (40%) |
|---|---|---|
| Low congestion | 21.50 [14.39–30.40] | 21.65 [16.66–29.26] |
| Medium congestion | 29.44 [28.42–44.73] | |
| High congestion | 34.12 [26.33–47.69] | |

*Note*: [a]Values in 2006 euros/respondent.

decreased by €1.23, the costs of suffering a high congestion scenario also being lower in absolute terms (€13.19). In spite of this, the attributes were ranked in the same way by both types of residents and their level values did not change linearly with the attribute levels for first-home residents either.

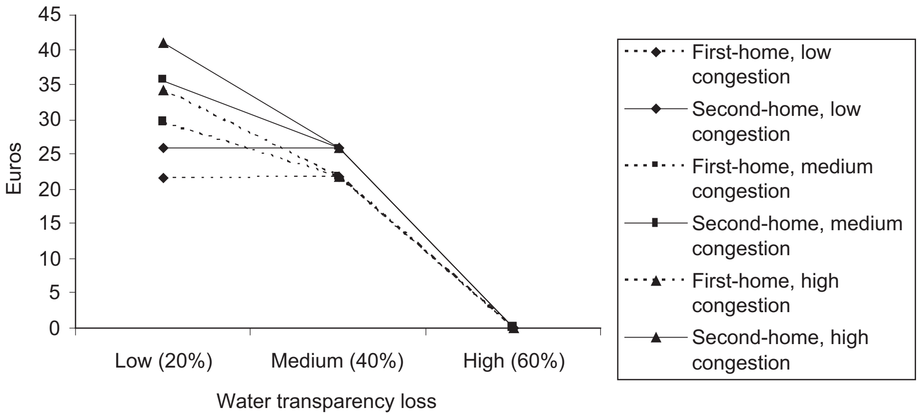


**Figure 3.** Bimonthly WTP of both types of residents for improvements in water transparency in relation to congestion.

Table 8 shows the WTP of those having a first home for enjoying a low and medium level of water transparency loss in terms of congestion at the beach and for a high or medium duration context.

As seen in Table 8, again the differences of WTP for low transparency loss were not statistically significant at the 5% level when congestion was medium or high, and changing to a medium level of transparency loss did not depend on congestion. Also, differences between the values of low and medium transparency loss were only statistically significant at the 5% level when congestion was medium or high, thus showing a non-linear decrease of WTP with the percentage of transparency loss.

Figure 3 graphically summarizes all the results above, showing the values for visibility in terms of congestion for both types of residents.

The larger values given by second-home residents to improving water transparency could be explained mainly by two factors. Compared to first-home residents, they engaged more frequently in recreational activities at the beach and it would thus be reasonable for them to demand better water quality. Besides, they were more aware of water changes related to a loss of transparency (13.5% versus 5.8% for first-home residents). Even some of the socio-economic features of second-home residents could also play a role in explaining their higher WTPs, although a more sound analysis would be needed for further research into the determinants of WTP (Table 9).

However, except when shifting to a high congestion scenario, WTPs were not significantly different between first- and second-home residents (Tables 5 and 7),[20] an interesting result if the high congestion rates experienced by Santa Ponça Bay during summer are taken into account. The same conclusions were drawn when comparing the results of Tables 6 and 8. In the light of the WTP distributions of water transparency for different congestion levels, it was found that the values assigned by both types of residents to a low and medium level of transparency loss were statistically the same for each congestion scenario. In this sense, both presented a statistical unique value for low loss of transparency

**Table 9. Descriptive statistics according to the type of resident.**

| | Sample average | |
|---|---|---|
| | First-home residents | Second-home residents |
| **Proportion** | 75.6% | 24.4% |
| **Origin...** | | |
| Spain | 81% | 57.7% |
| EU member states | 17.4% | 41.7% |
| *Germany* | *58%* | *46.2%* |
| *UK* | *31.8%* | *44.6%* |
| *Others* | *10.2%* | *9.2%* |
| Non-EU member states | 1.7% | 0.6% |
| **Years of residence** | 14.23 (6.8) | 10.46 (7.2) |
| **Owners** | 96% | 84.6% |
| **Use of second residences...** | | |
| Only during summer | – | 54.5% |
| During summer and other holiday periods | – | 32.1% |
| During summer, other holidays and weekends | – | 13.5% |
| **Male** | 45.5% | 48.7% |
| **Age** | 44.7 (13.3) | 46.4 (14.1) |
| **Net personal income (€)** | 2,798.57 (1,220.52) | 3,420.37 (1,058.23) |
| **Education...**[a] | | |
| Education level 1 | 24.9% | 11.5% |
| Education level 2 | 56% | 57.7% |
| Education level 3 | 19.1% | 30.8% |
| **Occupation...** | | |
| Employed | 50.4% | 34.6% |
| Self-employed | 14.1% | 26.3% |
| Housework | 16.6% | 17.9% |
| Unemployed | 1.7% | 5.1% |
| Retired | 12.2% | 10.9% |
| Student | 5% | 5.1% |
| **Family structure...** | | |
| Single | 6.2% | 3.8% |
| Family structure without children | 32.6% | 32.7% |
| Family structure with children | 61.2% | 63.5% |
| Two or less children | 89.8% | 92.4% |
| **Environmental group member** | 2.7% | 3.2% |
| **Collaboration with NGOs** | 13.9% | 23.1% |
| **Sport club member** | 13.9% | 21.2% |
| **Preference for organic products** | 44.7% | 42.9% |
| **Refuse separation for recycling** | 66.5% | 70.5% |

*Note*: The numbers in parenthesis represent the standard deviations for quantitative variables. [a]*Education level 1* includes the categories *No education*, *Have not finished elementary school* and *Basic education*; *Education level 2* corresponds to *Secondary school*, *High school degree* and *College degree*; *Education level 3* involves *University* and *Postgraduate*.

at medium and high congestion levels, this value diminishing when the number of people at the beach was low. On the other hand, when congestion was different from low, evidence was found of non-linear effects of water transparency on the welfare of both types of residents.

## Conclusions

This paper has shown that environmental economics can also make an important contribution to policymaking in tourism areas. In a context of increasing competitiveness among tourism destinations, in which emerges a new trend of tourism demand highly valuing environmental quality, the results presented in this article are expected to give policymakers useful information to manage their tourism product well and, hence, to make it more competitive. Although the framework of the study has been local, as it has focused on Santa Ponça Bay, a small Mallorcan tourism area, the paper could also serve management interventions in other areas suffering similar coastal water degradation problems, at both regional and national levels.

Using the loss of water transparency as an indicator of the environmental quality of the waters of Santa Ponça Bay, a CE was applied to measure its potential impact on water recreational activities, as well as the induced welfare losses for first- and second-home residents. To our knowledge, no study has focused on the implications that can be derived from this environmental problem in tourism areas. In addition, the use of interaction terms in the utility specification has resulted in relevant policy implications as it has been shown that the value assigned to the loss of water transparency depends on the levels taken by the remaining beach attributes. Put another way, using second-order effects has enriched the valuation exercise because it has allowed the eliciting of economic values for different context-specific scenarios. In this sense, in a framework of high or medium duration and medium congestion levels, the annual value of achieving a transparency loss of 20% for algal bloom episodes was €212.51 for second-home residents and €176.66 for those having a first home. For improvements leading to a transparency loss of 40%, the corresponding values were €156.27 and €129.91, respectively. However, these figures decreased as the duration of the blooms decreased. For instance, for a medium congestion level, the WTP for a transparency loss of 20% reached almost €82.41 for second-home residents and €68.50 for first-home individuals when the duration was low. On the other hand, at a medium or high duration level, the value of high transparency also decreased with congestion, being €155.19 for second-home residents and €129.01 for first-home residents.

Nevertheless, one of the main conclusions of the paper is that the WTP value differences between both types of residents were not statistically significant at the 5% level. Taking this into account, an important result of this article is that, when congestion and duration levels are medium or high, both first- and second-home residents assign the same unique value to high transparency and show a non-linear decrease in the valuation function for the transparency loss attribute. Therefore, given that the congestion levels at the beaches of Santa Ponça Bay during summer are not low, a policy decreasing the intensity of the blooms would be welfare improving for both types of residents. In this sense, evaluation of the programmes adopting measures to mitigate the emissions of nutrients should be of interest on the grounds of the environmental costs infringed on residents.

## Endnotes

1. Data from *Entering the 21st Century. World Development Report 1999/2000* from the World Bank [http://www.worldbank.org/wdr/2000/fullreport.html, accessed August 2008].
2. Data from *The Tourism in the Balearic Islands 2007* from the Balearic Tourism Research and Technologies Centre (CITTIB) [http://www.inestur.es/documentos/853_mi.pdf, accessed August 2008].
3. 2005 data from the Spanish Ministry of Public Works [http://www.fomento.es/, accessed August 2008].
4. The Law 1/1991 of 30 January 1991 on nature areas and urban planning of the area for special protection in the Balearic Islands designates *Natural Areas of Special Interest* (ANEI) as those areas with unique natural values and *Rural Areas of Landscape Interest* (ARIP) as those with singular landscapes transformed for traditional activities.
5. 2005 data from the Council of Calvià municipality [www.calvia.com].
6. Data from *The Tourism in the Balearic Islands 2007* from the Balearic Tourism Research and Technologies Centre (CITTIB) [http://www.inestur.es/documentos/853_mi.pdf, accessed August 2008].
7. Data from the *2001 Census of Population and Residences* from the Institute of Statistics of the Balearic Islands [http://www.caib.es/ibae/ibae.htm, accessed August 2008].
8. Data from the International Union for Conservation of Nature (IUCN) show that the amount of water used by tourists is about 440 litres a day due to the warm Mediterranean climate and to the fact that tourists usually drink more when on holiday. The increase in water consumption by tourists is also outlined in the *State and Pressures of the Marine and Coastal Mediterranean Environment* report from the European Environment Agency [http://reports.eea.europa.eu/ENVSERIES05/en/envissue05.pdf, accessed August 2008], in which it is argued that this consumption is nearly twice as high as that of the local population.
9. For simplicity reasons, subscript $j$ for explanatory variables has been omitted.
10. Experts argue that actions against eutrophication will probably result in neither the complete disappearance of the problem nor a return to the same ecological situation that characterized the bay some decades ago in a no degradation scenario, but rather to some new equilibrium. This explains why the loss of water transparency was never expected to be 0%.
11. Box 1 and Box 2 in the Appendix show the text and pictures used to describe the levels of water transparency loss and congestion, respectively.
12. An example of the choice set used is shown in the Appendix.
13. Versions were created to overcome possible order effect biases, as this enabled us to randomize the order of appearance of the choice sets across questionnaires.
14. Institute of Statistics of the Balearic Islands [http://www.caib.es/ibae/ibae.htm, accessed August 2008].
15. As protest answers, responses of individuals choosing the BAU alternative stating, as a reason, that they did not trust authorities or that they had already paid a lot of taxes and hence were not willing to pay any more were considered.
16. Wald tests were conducted to examine if single linear specifications for each attribute would capture the information observed using a non-linear effect specification. Results showed that a non-linear specification was required.
17. The inclusion of the ASC is justified due to its behavioural interpretation of status quo bias. If the ASC had not been included, the remaining model parameters would have been used to attempt to capture this effect, resulting in biased attribute parameter estimates (Adamowicz *et al*, 1998).
18. A likelihood ratio (LR) test was conducted to see if model differences for second-home residents were statistically significant. The LR value led to rejection of the null hypothesis that the specified model with the interaction term was not better than the model without it.
19. The confidence intervals for the WTP measures were calculated applying bootstrap by drawing 1,000 samples (with replacement) from the original estimation sample.
20. This result was maintained only when the levels of the remaining attributes were the ones of

the BAU alternative. When congestion was different from medium and/or duration was different from high, no statistically significant differences were found between the marginal WTP for high congestion of first- and second-home residents.

## References

Adamowicz, W., Louviere, J., and Williams, M. (1994), 'Combining revealed and stated preference methods for valuing environmental amenities', *Journal of Environmental Economics and Management*, Vol 26, pp 271–292.

Adamowicz, W., Swait, J., Boxall, P., Louviere, J., and Williams, M. (1997), 'Perceptions versus objective measures of environmental quality in combined revealed and stated preference models of environmental valuation', *Journal of Environmental Economics and Management*, Vol 32, pp 65–84.

Adamowicz, W., Boxall, P., Williams, M., and Louviere, J.J. (1998), 'Stated preference approaches for measuring passive use values: choice experiment and contingent valuation', *American Journal of Agricultural Economics*, Vol 80, pp 64–75.

Aguiló, E. (1999), *La despesa turística*, Direcció General d'Economia del Govern de les Illes Balears, Palma de Mallorca.

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*, Edward Elgar, Cheltenham, UK.

Bennett, J., and Blamey, R. (2001), 'The strengths and weaknesses of environmental choice modelling', in Bennett, J., and Blamey, R., eds, *The Choice Modelling Approach to Environmental Valuation*, Edward Elgar, Cheltenham, pp 227–242.

Blázquez, M., Murray, I., and Garau, J. (2002), *El tercer boom. Indicadors de sostenibilitat del turisme a les Illes Balears 1989–1999*, Lleonard Muntaner and CITTIB, Palma de Mallorca.

Boxall, P.C., Adamowicz, W.L., Swait, J., Williams, M., and Louviere, J.J. (1996), 'A comparison of stated preference methods for environmental valuation', *Ecological Economics*, Vol 18, pp 243-253.

Boyle, K.J., Poor, P.J., and Taylor, L.O. (1999), 'Estimating the demand for protecting freshwater lakes from eutrophication', *American Journal of Agricultural Economics*, Vol 81, No 5, pp 1118–1122.

Bullock, C.H., Elston, D.A., and Chalmers, N.A. (1998), 'An application of economic choice experiments to a traditional land use-deer hunting and landscape change in the Scottish Highlands', *Journal of Environmental Management*, Vol 52, pp 335–351.

Christie, M., Hanley, N., Warren, J., Murphy, K., Wright, R., and Hyde, T. (2006), 'Valuing the diversity of biodiversity', *Ecological Economics*, Vol 58, No 2, pp 304–317.

Colombo, S., Calatrava-Requena, J., and Hanley, N. (2006), 'Analysing the social benefits of soil conservation measures using stated preference methods', *Ecological Economics*, Vol 58, pp 850–861.

Hanley, N., MacMillan, D., Wright, R.E., Bullock, C., Simpson, I., Parsisson, D., and Crabtree, B. (1998a), 'Contingent valuation versus choice experiments: estimating the benefits of environmentally sensitive areas in Scotland', *Journal of Agricultural Economics*, Vol 49, No 1, pp 1–15.

Hanley, N., Wright, R.E., and Adamowicz, V. (1998b), 'Using choice experiments to value the environment', *Environmental and Resource Economics*, Vol 11, No 3–4, pp 413–428.

Hanley, N., Mourato, S., and Wright, R.E. (2001), 'Choice modelling approaches: a superior alternative for environmental valuation?', *Journal of Economic Surveys*, Vol 15, No 3, pp 435–462.

Hanley, N., Wright, R.E., and Koop, G. (2002), 'Modelling recreation demand using choice experiments: climbing in Scotland', *Environmental and Resource Economics*, Vol 22, pp 449–466.

Hanley, N., Wright, R.E., and Alvarez-Farizo, B. (2006), 'Estimating the economic value of improvements in river ecology using choice experiments: an application to the water framework directive', *Journal of Environmental Management*, Vol 78, pp 183–193.

Huber, J., and Zwerina, K. (1996), 'The importance in utility balance in efficient choice designs', *Journal of Marketing Research*, Vol 33, pp 307–317.

Jin, J., Wang, Z., and Ran, S. (2006), 'Comparison of contingent valuation and choice experiment in solid waste management programs in Macao', *Ecological Economics*, Vol 57, pp 430–441.

Koteen, J., Alexander, S.J., and Loomis, J.B. (2002), *Evaluating Benefits and Costs of Changes in Water Quality*, US Department of Agriculture, Forest Service, Pacific Northwest Research Station.

Louviere, J. (1988), 'Analysing individual decision making: metric conjoint analysis', in *Sage University Series on Quantitative Applications in the Social Sciences*, Vol 67, Sage Publications, Inc, Newbury Park, CA, pp 95.

Louviere, J.J., Hernsher, D.A., and Swait, J.D. (2000), *Stated Choice Methods: Analysis and Application*, Cambridge University Press, Cambridge.

McFadden, D. (1974), 'Conditional logit analysis of qualitative choice behavior', in Zarembka, P., ed, *Frontiers in Econometrics*, Academic Press, New York.

Machado, F.S., and Mourato, S. (2002), 'Evaluating the multiple benefits of marine water quality improvements: how important are health risk reductions', *Journal of Environmental Management*, Vol 65, No 3, pp 239–250.

Morey, E.R., Buchanan, T., and Waldman, D.M. (2002), 'Estimating the benefits and costs to mountain bikers of changes in trail characteristics, access fees, and site closures: choice experiments and benefits transfer', *Journal of Environmental Management*, Vol 64, pp 411–422.

Riera, A. (2000), 'Mass tourism and the demand for protected natural areas: a travel cost approach', *Journal of Environmental Economics and Management*, Vol 39, pp 97–116.

Riera, A., Ripol, A.M., Álvarez, M., Capó, J., Gómez, L., Grimal, X., Mateu, J., Palmer, T., and Rosselló, J. (2007), *Informe Econòmic i Social de les Illes Balears 2006*, Caixa de Balears 'SA NOSTRA', Palma de Mallorca.

Riera, P., and Mogas, J. (2004), 'Finding the social value of forests through stated preference methods: a Mediterranean forest valuation exercise', *Silva Lusitana*, Vol 12 (special issue), pp 17–34.

Rolfe, J., Bennett, J., and Louviere, J. (2000), 'Choice modelling and its potential application to tropical rainforest preservation', *Ecological Economics*, Vol 35, No 2, pp 289–302.

Scarpa, R., Ruto, E.S.K., Kristjanson, P., Radeny, M., Drucker, A.G., and Rege, J.E.O. (2003), 'Valuing indigenous cattle breeds in Kenya: an empirical comparison of stated and revealed preference value estimates', *Ecological Economics*, Vol 45, pp 409–426.

Smeral, E. (2003), 'A structural view of tourism world', *Tourism Economics*, Vol 9, No 1, pp 77–93.

Stoltel, W., Scatasta, S., Graneli, E., Weikard, H.P., and Van Ierland, E. (2003), *ECOHARM: The Socio-economic Impact of Harmful Algal Blooms in European Marine Waters*, European Comission (EVK3-CT-2001-80003), Brussels.

Thurstone, L.L. (1927), 'A law of comparative judgement', *Psychological Review*, Vol 34, pp 273–286.

# Appendix

**Box 1.** Loss of water transparency levels.

| | |
|---|---|
|  | Loss of water transparency of 20% |
|  | Loss of water transparency of 40% |
|  | Loss of water transparency of 60% |

**Box 2.** Congestion levels.

| | |
|---|---|
|  | **Low congestion**<br>The nearest person (or group of people) is more than 20 m away from you |
|  | **Medium congestion**<br>The nearest person (or group of people) is between 3 and 20 m away from you |
|  | **High congestion**<br>The nearest person (or group of people) is less than 3 m away from you |

CHOICE SET EXAMPLE

| Attributes | Programme A | Programme B | No programme (C) |
|---|---|---|---|
| Water transparency |  Loss of 60% |  Loss of 40% |  Loss of 60% |
| **Duration** | **6 weeks of algal blooms** | **3 weeks of algal blooms** | **8 weeks of algal blooms** |
| Congestion |  The nearest person (or group of people) is **more than 20 m away from you** |   The nearest person (or group of people) is **less than 3 m away from you** |  The nearest person (or group of people) is **between 3 m and 20 m away from you** |
| **Extra cost** | **€18** | **€12** | **€0** |