Ocean & Coastal Management 63 (2012) 55–66

Contents lists available at SciVerse ScienceDirect

Ocean & Coastal Management

journal homepage: www.elsevier.com/locate/ocecoaman

On the relationship between quality, users' perception and economic valuation in NW Mediterranean beaches

Eduard Ariza [a,*], Ramon Ballester [b], Ricard Rigall-I-Torrent [b], Albert Saló [c], Elisabet Roca [d], Miriam Villares [d], José A. Jiménez [e,f], Rafael Sardá [g]

[a] Laboratory for Coastal Research, International Hurricane Research Center, Florida International University, Modesto Maidique Campus, 360 MARC Building, Miami, FL 33199, United States
[b] Departament d'Economia, Universitat de Girona, Facultat de Ciències, Econòmiques i Empresarials, Campus Montilivi, 17071 Girona, Spain
[c] ESADE, GRUGET Research Group Tourism Management, Av. de la Torre Blanca 59, E-08172 Sant Cugat del Vallès, Spain
[d] Laboratori d'Estudis Socials de l'Enginyeria Civil, ETSECCPB, Universitat Politècnica de Catalunya, Jordi Girona 1-3, Campus Nord Ed. B1, 08034 Barcelona, Spain
[e] Laboratori d'Enginyeria Marítima, ETSECCPB, Universitat Politècnica de Catalunya, Jordi Girona 1-3, Campus Nord Ed. D1, 08034 Barcelona, Spain
[f] International Centre for Coastal Resources Research, Barcelona, Spain
[g] Centre d'Estudis Avançats de Blanes, CSIC, Carrer d'Accés a la cala St. Francesc 14, 17300 Blanes, Girona, Spain

ARTICLE INFO

Article history:
Available online 16 April 2012

ABSTRACT

The relationships between two traditional economic valuation methods, Travel Cost Method (TCM) and Hedonic Prices (HPs) are tested in a sun-and-beach tourist-oriented area in the Northwestern Mediterranean coast in order to appraise/value beach integral quality and its attributes. Traditional economic methods do not seem to capture the aggregate quality of beaches, although this study has shown that positive relationships were found between HP and integral beach quality. Instead, these methods are more (positively) related to specific aspects such as Services and Facilities Quality, Natural Conditions Quality (dune system development) and Access and Parking Quality. The results of this study show that these methods do not sufficiently value beach social–ecological resources at the study site. In this paper we also compared users' economic beach valuation (using TCM and HP) with the expenditure on general maintenance and sediment management by local managers. The results show an important gap between investments made by managers (less than 1 million €/year) and users' economic valuation (more than 1 million €/day at the peak of the season). These results suggest the feasibility of establishing a beach management tax for beach-related economic activities that could be used to improve the weakest aspects of beach management in the region.

1. Introduction

Beaches are complex social–ecological systems where different processes (e.g. physical, ecological, recreational) occur (James, 2000). Studying and monitoring the different dynamics related to these processes is a multidisciplinary task that has to be undertaken using different methods, scales and units. Recently, beach research has overcome its traditional exclusive concentration on sediment problems and recreation (Bird, 1996), to follow a more holistic approach (James, 2000). Although in practical terms, beach management is still primarily concerned with satisfying users' expectations (Ariza et al., 2008), theoretical demand for the introduction of more integral concepts in beach management has been formulated. New beach management models are based on the formulation of beach integral quality as the desired vision for their future. The integral quality of beaches has been accurately conceptualized in recent works (Micallef and Williams, 2004; Cervantes and Espejel, 2008; Ariza et al., 2010), and its fundamental aspects have been clearly defined, organized and structured. Inspired by the idea to manage beaches under an ecosystem-based management framework, Function Analysis has been recently incorporated into newly created management tools (De Groot et al., 2002; Micallef and Williams, 2003) with the aim of ensuring that beach functions maintain their qualities over time.

Beaches are one of the most important Natural Capital assets found in coastal areas (Brenner et al., 2010). They provide various environmental services, e.g., recreation, habitat protection. Some attempts to monetarily value such services have been made using environmental economics tools. In this paper we have explored if all the fundamental aspects included in the concept of integral

* Corresponding author. Tel.: +1 305 348 8364; fax: +1 305 348 1761.
E-mail address: ariza.eduard@gmail.com (E. Ariza).

0964-5691/$ – see front matter © 2012 Elsevier Ltd. All rights reserved.
doi:10.1016/j.ocecoaman.2012.04.002

beach quality could be picked up by the use of two non-market valuation methodologies. The main objective of this paper is to analyze the existence of a dependence or relationship between the economic valuation of beaches and the measurement of beach quality. Since different valuation techniques exist, it is also an objective of this work to assess which of these could be the most suitable for our purpose (if any). Finally, obtained economic values are compared to public investment of the Administration for managing the beaches that were the objects of this study.

2. Economic valuation methods for beach social–ecological systems

Studies valuing beach resources from an economic viewpoint have been extensively carried out through the use of various methodologies. Studies using the Travel Cost Method (TCM) have defined beach values based on the economic costs incurred by beach users traveling to the beach (Bell and Leeworthy, 1990). The TCM is useful for valuing recreational services when environmental protection projects favour tourist activities on coastal areas (Riera Font, 2000) or other inland areas (Fleming and Cook, 2008). Another important method used for beach resource valuation involves Hedonic Prices (HPs). This method has been used to value the local benefits of the beach width (Pompe and Rinehart, 1994) and recreation (Edwards and Gable, 1991). Contingent valuation (CV) and other stated preference methods have also been used in several beach studies (Shivlani et al., 2003; Silberman and Klock, 1998; Whitehead et al., 2008).

Aforementioned methods (TCM, HP, CV) are based on a strong comparability of values (Martinez-Alier et al., 1998), which implies that ecosystem services and their quality can be measured by reducing their values to a single unit, primarily in monetary terms. However, beaches have many attributes contributing to environmental quality, and some of them may not be easily and/or meaningfully translated into a monetary scale. In contrast, the theory behind Ecological Economics is based on a weak comparability of values and which argues that natural resources should be valued using multi-criteria approaches (Martinez-Alier et al., 1998). In spite of the diversity of economic valuation methods available, it is difficult (and often controversial) to put a monetary value on non-marketed attributes, such as a beach's scenery or its natural diversity. Indeed, the prevalent methods of non-market economic valuation have been criticized on multiple counts. Hedonic methods and travel costs fail to take into account the existence, bequest and option values (Krutilla, 1967). Existence values are concerned with the mere existence of biological and/or geomorphological variety and its widespread distribution, whether it is utilized or not. Bequest values refer to the value of the satisfaction obtained from preserving a natural environment for future generations. Option values refer to the willingness to pay for retaining an option to use an area or facility that would be difficult or impossible to replace and for which no close substitute is available. Contingent valuation can take into account those values, but it presents problems which may result from an absence of preferences on some characteristics of ecosystems (Diamond and Hausman, 1994). In other words, economic valuation methods focus on the characteristics valued by humans. This implies that those aspects not easily perceived or those deemed unimportant by individuals may be ignored (although they are important for the preservation and the sustainability of ecosystems).

Assuming the limitations of these valuation methods, the present research has been developed in order to test the capability of the Travel Cost and Hedonic Pricing methods to pick up important beach attributes that are also involved in the production of ecosystem services. Some of the attributes of the beaches may contribute to different ecosystem services and be related to different values (i.e. plant life is related to the quality of the habitat, but also to the quality of the landscape). Therefore, those attributes may have unknown relationships with the valuation methods used. For this reason, it is interesting to establish the relationship of the studied methods with beach attributes, as well as to analyze user preferences for the different components of Integral Quality.

3. Study site and methods

3.1. Study site

The study was carried out in six beaches of the coastal regions of El Maresme and Costa Brava in the Catalonian coast (NE Spain) (Fig. 1, Table 1). With the exception of Malgrat and S'Abanell, which are rectilinear open and semi-open beaches respectively, the region is characterized by a highly indented coastline with small pocket beaches located between rocky cliffs. Tourism is the main socio-economic activity in the region. Consequently, the region has been subjected since the 1950s to an increasing urbanization process associated with resort and home building. In the past, we developed the Beach Quality Index (BQI, Ariza et al., 2010) to measure integral beach quality in this region. The study site was chosen because it is representative of many coastal areas worldwide that are heavily influenced by intense tourism and construction activities. In 2005, 5.3 million tourists visited the Costa Brava (Sardá et al., 2009).

3.2. Methods

3.2.1. Economic valuation

In order to assign monetary valuations to beaches, three different techniques were used: the TCM, HP Index of Hotels and HP Index of Houses. Both methods have several limitations. As discussed above, both the travel cost and the hedonic method fail to take into account the existence, bequest and option values. Therefore, the valuations obtained from these methods represent a lower bound to the actual social valuation. Another limitation is that both methods assume weak complementarity, that is, the methods are useful for attaching a valuation to given characteristic when it is possible to trace the behaviour of individuals to changes in the characteristic analyzed (see, for instance, Haab and McConnell, 2002). Besides these common shortcomings, each method has its own specific limitations.

The TCM computes individuals' willingness to pay for participating in a given recreation activity (i.e. visiting a beach) by taking into account the costs (e.g. travel costs, access fees, equipment costs, or the opportunity cost of time) incurred by the individuals to participate in the activity. The TCM presents some limitations as a way of valuating non-marketed resources. As argued by Randall (1994) visitation costs are inherently subjective. Indeed, many assumptions are needed in order to compute the cost estimates. Randall (1994) goes as far as stating that: "TCM cannot serve as a stand-alone technique for estimating recreation benefits; rather, it must be calibrated using information generated with fundamentally different methods." Nevertheless, Randall acknowledges that although they are subjective, visitation costs are "ordinally measurable so long as the cost increases with distance travelled". In this sense, the TCM seems valid for comparing the social valuation attached to similar sites.

HP models of hotels and houses assume that hotels and houses are bundles of objectively measured public and private characteristics. For instance, with hotels, such bundles include rating/category, quality of food, room service, availability of car parking, sports facilities, swimming pool and spa, degree of preservation of the environment, public infrastructures and/or available amenities.

Fig. 1. Beaches assessed in the valuation study.

Hedonic methods decompose the market prices of hotel rooms and houses into implicit prices of the different characteristics embedded in the bundle. Hedonic methods assume that a unique price exists for each of the characteristics embedded in the final product. As noticed by Rigall-I-Torrent and Fluvià (2011), the assumption of a unique price for each attribute is not as strong as it seems. It can be imagined as the outcome of a game in which firms choose their products' attributes and prices taking into account consumers' tastes and whatever the competitors are currently doing. Therefore, if customers choose their consumption bundle based on a given rule, then the best each firm can do is to set the price that maximizes its expected profit given the prices set by the competitors, since in such circumstances more sophisticated strategies usually cannot yield better results. With the help of hedonic methods, we end up with a measure of how much a given characteristic/asset affects the price of a hotel or of a house. If economic agents in the market are fully aware of their preference functions and their cost functions, then the resulting market equilibria can be interpreted as being marginal values. The characteristics of the market analyzed and the sources used to gather prices strongly suggest that these conditions hold (Rigall-I-Torrent and Fluvià, 2007, 2011).

We make use of a previous beach user survey (Roca and Villares, 2008) which allows us to calculate the Travel Cost of summer trips (Summer Travel Cost) and the cost of travel during the rest of the year, outside the bathing season (Yearly Travel Cost) for trips to the six beaches studied. The area of study is a seasonal beach destination area. Beach use is mainly concentrated in the period June–September (high season). The demand and the prices of hotels, rentals and supplies are higher during these months than during the rest of the year. Therefore, two different values have been calculated in order to account for that seasonal difference. In this way, it was possible to obtain data about beach economics for the entire year (i.e. bathing and non-bathing season). There were two ways of calculating the travel cost to the beach, depending on whether direct expenditure by beach users was included or not (i.e., expenditures for food and leisure activities). Both estimates included transportation costs, costs for parking near the beach, and the opportunity cost for spending the day on the beach. The transportation cost was computed by taking into account the distance to the beach, the type of transportation used (e.g., bus, car or bicycle) and the number of users per trip (i.e., number of people sharing the car). As is usual in travel cost studies (i.e. Parsons, 2003), the opportunity cost of time was estimated to be 30% of the market wage, which was obtained by taking into account the average wage earned in the sector where the traveler claims to work, and the hours he/she spent traveling to and from the beach. This database was used to estimate a count data travel cost model by means of Poisson regression (i.e. Parsons, 2003) for each of the available beaches. This model yielded an average per trip-value for each beach (for more technical details see Electronic Appendix A).

Table 1
Main beach characteristics.

Beach		Type	Exposure	Length (m)	Width (m)
Platja Malgrat Nord	Mal	Urbanized	High	2500	63.5
Platja S'Abanell Nord	S'Ab	Urban	High	1500	35
Platja Treumal-Sta. Cristina	T-SC	Urbanized	Moderate	446	31–40
Platja de Lloret Centre	LLo	Urban	High	1300	49
Platja de Canyelles	Cany	Urbanized	Moderate	400	35
Platja Tossa-Mar Menuda	T-MM	Urban	High	530	70–30

HPs were determined by calculating the increase in the latest prices of houses and hotel rooms found near the beach. For the hedonic analysis of hotel rooms, we relied on the database used by Rigall-I-Torrent and Fluvià (2007, 2011). The database contains information on prices provided by tour operators and private characteristics for 279 coastal hotels sampled for six months during the year 2000 in 15 areas of Catalonia (two observations per month). Following previous results of hedonic pricing methods applied to hotels (e.g. Espinet et al., 2003; Haroutunian et al., 2005; Rigall-I-Torrent and Fluvià, 2007, 2011; Thrane, 2005), a log-linear regression of price on hotel characteristics, period of the year, jurisdiction where the hotel was located and beachfront location was estimated. With these estimates an index was computed to capture the differential effects of location (i.e., beachfront) on

different types of beaches (for more technical details, see Electronic Appendix B).

Another database was used to perform the hedonic analysis on homes (primarily second homes). Data was collected from intermediaries' websites of secondary rental homes during the peak-season in August 2009. Information on prices and characteristics (including location with respect to the beach) was considered. Low rental market activity and geographical constraints were the reason for the absence of observations found on some of the sampled beaches. Overall, 122 houses on six beaches were used to run a log-linear regression model of house characteristics on price (see Bover and Velilla, 2002 for primary homes in cities; Benson et al., 1998; Hamilton, 2007; Pompe and Rinehart, 1994 for coastal homes and Saló, 2005; Saló and Garriga, 2011 for coastal rental second homes). Using the regression coefficients to measure the influence of characteristics on the final price of a house, an index was constructed for the six beaches under consideration (see more technical details in Electronic Appendix). The annual valuation of tourists staying in secondary rental homes at Lloret Centre Beach was also calculated (see Electronic Appendix C).

The economic valuation produced by the above methods was then contrasted with: (a) estimations of the beach quality according to values obtained by using the integrated Beach Quality Index, BQI, and partial quality sub-indexes (Ariza et al., 2010) (Tables 2 and 3); (b) the information on beach users' perception (Roca and Villares, 2008; Roca et al., 2008, 2009; Sardá et al., 2009) and (c) patterns of use of the studied beaches (temporal and spatial variability) (Roca et al., 2008; Sardá et al., 2009).

Having collected the different data, the revenue generated by users visiting the beach was calculated for the beaches of Malgrat de Mar, Sta. Cristina, Lloret Centre, Canyelles and Tossa-Mar Menuda. For the beach of Lloret Centre, by determining the accumulated number of users visiting the beach during a single day at the peak of the season, it was possible to estimate the daily Consumer Surplus. For the remaining beaches, it was only possible to estimate the Consumer Surplus for the peak of the day during the peak of the season (considering the maximum number of users present at the same time at the beach).

It was considered that the various necessary assumptions for interpreting our estimates as measures of Consumer Surplus (i.e. willingness to pay by individuals) were held. This is a reasonable assumption for the region analyzed (see Rigall-I-Torrent and Fluvià, 2007, 2011). In the case of hedonic methods, Rosen (1974) showed that when differentiated products are sold in perfectly competitive markets, then the equilibrium price schedule results from the interaction of consumers and firms. As a result, the marginal price of a characteristic is equal to both the average marginal willingness of tourists to pay for an additional unit of the characteristic embedded in the tourism product, together with the amount of money for which firms are willing to embed the characteristic in the final product. Hence, from the parameters of the HP function, it is possible to recover information about the marginal value consumers place on characteristics and the marginal cost firms incur to include different characteristics in their product. Notice, however, that regression coefficients capture an average willingness to pay only if preferences are homogeneous across the entire population (see, for instance, Chay and Greenstone, 2005). If market response is a result of preference heterogeneity, one might only recover an average across subpopulations that sort themselves according to their valuation of specific product characteristics.

3.2.2. Beach quality values

The "objective" beach quality was measured through the BQI, which considers overall quality as an aggregated measure of different contributing factors (Ariza et al., 2010). The BQI is formed by three components accounting for main functions supported by beaches in the area: the Recreational Function Partial Index (RFI), the Natural Function Partial Index (NFI) and the Protective Function Partial Index (PFI). They group thirteen sub-indices (Tables 2 and 3). These partial indices and sub-indices are linearly combined to obtain the BQI, with proportionality coefficients or weighting factors obtained from experts and users' valuations (see details in Ariza et al., 2010).

3.2.3. Users' perception

The "subjective" beach quality was measured in this study through the perception of beach users obtained in a field survey (Roca and Villares, 2008). To this end, questionnaires were carried out during the last weekends of July during the summer seasons of 2004 and 2005. In total, 700 questionnaires were collected from a random group of beach users. The questionnaire included questions about different aspects of the beach to catch the users' view on partial qualities (e.g. physical and morphological, environmental, equipment and services, design and comfort, as well as, the global evaluation (see details in Roca et al., 2008)).

4. Results and discussion

4.1. Beach economic value vs. quality

Beach economic values as obtained through the three valuation methods employed (TCM, the HP Index of Houses and the HP Index of Hotels) are shown in Table 4. The results obtained show that for the Summer and Yearly Travel Cost Economic Valuations, results for the beach of Malgrat de Mar are higher than for the rest of beaches. This is because the majority of users use a private vehicle as a means of transportation from the Barcelona Metropolitan Area, while for the other beaches, they are lodged in the nearby. For the same beach, the results obtained for HP show the opposite trend (they are the lowest). The type of land use surrounding this beach is mainly agricultural (this is not the case for the other beaches) and the fact that this beach is outside the area classified as the Costa Brava (an important "brand name" attractor of tourists from around the world), is probably responsible for the lower values of HP found. Moreover, this low value of HP may be due to the low provision of public goods and services not related to the beach (see Rigall-I-Torrent and Fluvià, 2007, 2011). The investment made by managers in services and facilities in this beach is lower than for the rest of the studied beaches, and its erosion problems are higher, but some people prefer its particular tranquility and natural conditions. In general (without considering this exception), values obtained using TCM and HP are higher for semi-urban beaches (i.e. Malgrat de Mar, Sta. Cristina and Canyelles) than for the urban ones (i.e. S'Abanell, Lloret Centre and Tossa-Mar Menuda). This finding has clear implications for managers, since it is in accordance with individuals valuing the natural capital of the coast when choosing which beach to visit and the place for living. Therefore, for this beach investing in capital natural is likely to yield higher returns to users other types of investment.

The results obtained with the three valuation methods (TCM, the HP Index of Houses and the HP Index of Hotels) (Table 4) were related to all quality indices described and defined in Tables 2 and 3. Only the important correlations were considered and are presented in the following section (those correlations whose coefficient scores were equal to or greater than 0.7, whether they were deemed significant or not).

4.1.1. Summer and yearly travel cost method (STCM and YTCM)

In the present work, we used all indices described in Table 2 to determine if the most important relationships described in the

Table 2
Structure of the Beach Quality Index and results for the studied beaches. COMP = Components; DES = Description; IMP = Importance; Mal = Malgrat de Mar; S'Ab = S'Abanell; T-SC = Treumal-Sta. Cristina; Llo = Lloret Centre; Cany = Canyelles; T-MM = Tossa-Mar Menuda.

COMP	Partial indices	DES	IMP	Beaches					
				Mal	S'Ab	T-SC	LLo	Cany	T-MM
RFI: Monitors processes related to the recreational experience of users	α: Microbiological water quality	Provides criteria for evaluating Coliforms and Streptococcus	Detection of organic pollution (mandatory)	1	1	1	1	1	1
	IC: Beach crowding	Measure of quality of use considering optimum and crowdedness thresholds	Detection of overuse (very common in tourist beaches)	1	1	0.17	0.52	0.18	0.18
	IEQ: Environmental quality	Integrated measure of the aesthetic and hygienic environmental quality	Monitors aesthetic and hygienic environmental quality (very important for users)	0.41	0.73	0.75	0.73	0.75	0.77
	ISerF: Services and facilities	Evaluation of 11 components. Differences for urban and urbanized beaches	Monitor adequate provision of services and facilities (very important in tourist beaches)	0	0.825	0.866	0.775	0.941	0.875
	IAct: Activities	Evaluates annoying and other types of undesirable behaviour	Detection bothering activities (very important in tourist beaches)	0.6	1	0.8	1	0.6	1
	IAcPar: Access and parking	Measure of accessibility to surrounding areas, signposting, access to the beach and parking and transportation	Assessment of accessibility (very important according to questionnaires)	0.78	0.93	0.75	0.89	0.86	0.96
	IComf: Comfort quality	Evaluation of aspects of the beach structure and climatic conditions that affect users' experience: 8 factors	Monitor comfort (very important according to questionnaires)	0.64	0.64	0.82	0.76	0.76	0.63
	IS: Surrounding area quality	Evaluates landscape and aesthetic quality	Monitor increasingly degraded coastal landscape	0.44	0.38	0.66	0.37	0.53	0.54
	IBS: Beach safety	Integrated measure of the safety and rescue services	Provides a measure of safety conditions (very important according to questionnaire of beach experts)	0.33	0.58	0.42	0.50	0.42	0.58
RFI value				0.53	0.73	0.63	0.68	0.60	0.69
NFI: monitors processes related to beach bio-physical condition	IN: Natural conditions	Assess quality of the natural systems in the wind-controlled upper part of the beach (vegetation representation, surface coefficient and development of the habitat)	Monitor quality of the typical natural community very degraded in many beaches	0.63	0.46	0.59	0.14	0.42	0.38

(*continued on next page*)

Table 2 (*continued*)

COMP	Partial indices	DES	IMP	Beaches					
				Mal	S'Ab	T-SC	LLo	Cany	T-MM
	IWSP: Water-sand pollution	Monitors effects of pollution events on different natural communities	Monitor frequent pollution events	0.75	1	1	1	1	1
	IPQ: Physical quality	Represents the effect of human changes on the physical properties of beaches (grain size, surface and wave regime)	Monitor changes in physical quality by human activities	1	1	1	1	1	1
NFI value				0.80	0.92	0.91	0.87	0.88	0.91
PFI: Monitors gains and losses of sediments in relation to protection of coastal facilities	IPP: Protection	Represents the importance of beaches in protecting coastal features in the study area	Monitor vulnerability of coastal facilities (very important due to frequent severe damage in many coastal areas)	0.5	0.48	1	0.61	0.83	1
PFI value				0.50	0.48	1	0.61	0.83	1
BQI value				0.60	0.67	0.82	0.68	0.75	0.81

literature are also reflected on the economic valuation of beaches. The results of the most important relationships of the TCM and BQI attributes are presented in Table 5. As a general trend, the TCM values are directly and positively related to Services and Facilities Quality and Natural Conditions Quality, and negatively related to the RFI (Recreational Function Index), the NFI (Natural Function Index), Beach Safety Quality, Environmental Quality and Surrounding Area Quality.

The beach choice of users in the area is mainly conditioned by proximity and the attractiveness of the landscape (Roca et al., 2008). An important aspect that conditions beach use is the means of transportation to the beach. There is a major portion of beach tourists, i.e., foreigners, that are lodged in hotels or apartments in urban areas, who travel to the nearest beach on foot. They most often frequent urban beaches. Although they may like attributes of semi-urban beaches, they do not show a willingness to pay high enough for these attributes to use them (to do so, they would need to rent a car or use public means of transportation). On the other hand, there is also another group of people, formed by locals and residents in the Barcelona Metropolitan Region, that use semi-urban beaches more frequently. This group of people normally use private means of transportation. They choose semi-urban beaches due to the attractiveness of the landscape, and they spend more time and money on the visit. This has a clear positive effect on the values obtained with TCM. Natural Conditions Quality scores (that assesses quality of dune systems) capture the difference between the degree of naturality of urban and semi-urban beaches (more than Surrounding Area Quality, in this case). For this reason, STCM valuations are positively related to Natural Conditions Quality. TCM also values the protection of some attributes of beach natural community (dunes), because it triggers recreational benefits (Riera Font, 2000), although it fails to consider other aspects related to conservation of beach environments as environmental quality or quality of the surrounding areas. These aspects are likely to be more difficult to perceive by users and, therefore, they are not captured by the TCM (remember the discussion on weak complementarity above). On the other hand, due to the more stringent definition of applicable criteria for urban beaches than for semi-urban ones, Services and Facilities Quality is lower in urban beaches than it is in the semi-urban ones (some criteria such as children's facilities and sports facilities are important for urban beaches, but are not considered for semi-urban ones). Due to this fact, a positive relationship has been found between TCM valuation and Services and Facilities Quality. This finding is in accordance of users showing higher willingness to pay for those aspects of beaches which are easily perceived. No other sub-indices or aggregated measurements showed to be positively related to the TCM.

The TCM was not positively or negatively related to Integral Quality. It seems that users are not influenced by many aspects that have been included in the BQI. Two components measured by the BQI (Recreational (RFI) and Natural (NFI)) were negatively related to STCM (Table 5). The other one (Protective (PFI)) was also not related in any way. The TCM is negatively related to RFI due to the fact that many aspects of beaches included in the Recreational Function are less well managed in semi-urban beaches than in the urban ones. The reason why the TCM is negatively related to the NFI and positively related to the Natural Conditions Quality sub-index may be due to the Physical Quality sub-index (one of the three sub-indices of the NFI). For the period studied, no changes to the physical properties of beaches have occurred (due to human activity) and pollution events only happened once at the beach of the Malgrat Nord (with a developed dune system). Therefore, results for that sub-index may obscure the relationship between the TCM and the natural characteristics of beaches.

Table 3
Definition of the Beach Quality Index. COMP = Components; DEF = Definition; FM = Frequency of Measurement (Weekly, Seasonally, Yearly); OR-SC = Original scale of measurement (for more detailed information, see Ariza et al., 2010).

COMP	Partial indices	DEF	FM	OR-SC
RFI: Monitors processes related to the recreational experience of users	α: Microbiological water quality	Based on the requirements established in EC Directive 1976/160/EC (repealed by 2006/7/EC). Total Coliforms, Faecal Coliforms and Faecal Streptococcus are considered. The categories Very Good, Good, Moderate, Deficient and Bad (defined in the Directive) have been converted in 5 numerical values: 1, 0.8, 0.5, 0 and 0.	W	Ufc/100 ml (100–20,000)
	IC: Beach crowding	Sand availability (m^2/user) is converted to a 0–1 scale. For urban beaches scores of 0.2 are given to crowded beaches (4 m^2/user) and scores of 1 to beaches with equal or higher sand availability than 8 m^2/user (scores of 0–4 m^2/user are linearly escalated between 0 and 0.2 and scores between 4 m^2/user and 8 m^2/user between 0.2 and 1). For semi-urban beaches, crowding scores of 0.2 are given when sand availability reaches 8 m^2/user and 1 when it reaches 12 m^2/user (scores between 0 and 8 m^2/user are escalated between 0 and 0.2 and scores between 8 and 12 m^2/user between 0.2 and 1).	S	m^2/user (0–16)
	IEQ: Environmental quality	Integrated measure of the aesthetic and hygienic environmental quality. Visual assessment of water and sand: 1) Water quality parameters: colour, transparency, solid anthropic waste, plant waste, marine plant waste, foam, tar, odour, oil, and the presence of jellyfish. 2) Sand quality parameters: beach user waste, anthropic waste, plant waste, marine plant waste, tar and the presence of jellyfish. The daily scores were averaged for the whole season and values normalized to the range 0–1. The presence of a rainwater outfall penalized 0.2 the final score, and beach closures during the season 0.25 each one.	W	Qualitative scale 1–5
	ISerF: Services and facilities	Evaluation of 11 components: Beach guarding, showers and feet washers, umbrellas and hammocks, bins, children facilities, restaurant/bars and kiosks, handicapped facilities, telephone, information, sanitary facilities and sports facilities. They were classified as Basic, Important and Not considered. According to different criteria defined in literature and expert and user opinion polls, each service was classified as Good, Regular or Bad for each beach. Different criteria were considered for urban and urbanized beaches.	S	m and presence (distance between facilities; existence of facilities)
	IAct: Activities	Evaluates annoying and other types of undesirable behaviour. Sports outside specific areas, the presence of pets, fishing during bathing hours, and sailing activities in bathing areas were considered to have a negative impact on the enjoyment of most users. Each of these activities detected reduced the final score by 0.2 points from an initial score of 1.	W	Presence (existence of activities)
	IAcPar: Access and parking	Measure of accessibility to surrounding areas (asphalt), signposting (quality), access to the beach (distance parking-beach, distance between pedestrian accesses, state of accesses, distance between traffic accesses and distance between footbridges) and parking and transportation (public transportation and parking bicycles) according to expert criteria.	S	m, presence and quality (distance; existence; state)
	IComf: Comfort quality	Evaluation of aspects of the beach structure (width, slope of dry area, slope of wet area, obstacles, step and abrasive material) and climatic conditions that affect users' experience (water temperature and % of sunny days). According to results of user's polls were classified as good, moderate and bad.	S/W	m, degrees, quality, cm, degrees Celsius and % (distance: slope intensity, height; temperature; weather conditions)
	IS: Surrounding area quality	Evaluates landscape and aesthetic quality. The landscape index consist of 3 factors (the percentage of impervious surface in the hinterland (a band of 500 m around the beach), the percentage of coastal defence works against beach length, and the percentage of the water table enclosed by harbour and/or marine developments. The aesthetic value was scored by calculating the percentage of rural/agricultural and impervious land use in the viewshed of the beach	3 years	% (artificial land use surface)

(*continued on next page*)

Table 3 (*continued*)

COMP	Partial indices	DEF	FM	OR-SC
		(the viewshed is the portion of the surface that it is visible from a given point on or above it)		
	IBS: Beach safety	Integrated measure of the safety and rescue services based on the presence (and degree) of 12 components: Facilities, transport material, communication material, rescue material, sanitary material, emergency warning, buoying, signposting of dangerous areas and activities, risk assessment of each beach, preventive plan, indicators of accidents and, absence of wave regime risk.	S	Presence (existence of safety elements)
	IN: Natural conditions	Assess quality of the natural systems in the wind-controlled upper part of the beach: 1) Vegetation representation: number of beach species/number of beach species in a catalogue; 2) Surface coefficient: Surface of vegetation/beach surface over drift line and 3) Development of the habitat coefficient: degree of dune community development.	2 years	% and quality scale (number of species; vegetated surface; dune system development)
NFI: Monitors processes related to beach bio-physical condition	IWSP: Water-sand pollution	Monitors effects of pollution events on different natural communities through closures. Each closure subtracts 0.25 points from an initial score of 1.	S	Number of events (pollution episodes)
	IPQ: Physical quality	Represents the effect of human changes on the physical p roperties of beaches: 1) Grain size, 2) Surface and 3) Wave regime (in the last 10 years). The observed alteration is considered as moderate or severe (affectation to 30% of beach area or higher) for the three factors.	S	% (affected surface)
PFI: Monitors gains and losses of sediments in relation to protection of coastal facilities	IPP: Protection	Represents the importance of beaches in protecting coastal features in the study area. It measures beach capability to dissipate wave energy and prevent damage to promenades and maritime facilities. The factors included are: 1) the effective beach width (EBW): distance between existent infrastructures and the shoreline 2) the storm reach (SR): the beach width potentially eroded by a storm of a given return period and 3) the minimum beach width (MBW): the minimum width required to have an operative beach for protection purposes.	S	% (length of beach protected)

Table 4
Economic valuation calculated for the different methods used. The last column represents the users' consumer surplus at the peak of beach use in the summer for every single beach (calculated for the maximum number of users present at the beach at the same time). STC = Summer travel cost, YTC = Yearly travel cost, HP = Hedonic price, MNU = Maximum number of users (at the same time) at the peak of the summer (Roca et al., 2008) and CS = Consumer surplus.

Beach	STC economic valuation (€/user)	YTC economic valuation (€/user)	HP hotels (no units)	HP of houses (no units)	MNU	CS (€)
Malgrat de Mar	42.6	29.8	100	100	1311	55,848.6
S'Abanell	–	–	110.8	110.1	5558	–
Sta Cristina	19.4	10.4	–	124.6	1292	25,064.8
Lloret Centre	18.2	9.7	135.1	123.3	10,946	199,217.2
Canyelles	23.7	25.4	–	131.9	852	20,192.4
Tossa-Mar Menuda	17.9	21.7	194	115.6	4816	86,206.4

The YTCM was also negatively related to Quality of Surrounding Areas, Beach Safety Quality and Environmental Quality (Table 5). Users' choice is not affected by beach safety differences (in the study area) (Roca et al., 2008). On the other hand, urban beaches have better provisions for safety than the semi-urban beaches do (the TCM shows that users spend more money visiting semi-urban beaches than urban beaches). The number of users visiting each type of beach does not seem to be affected by those differences.

Differences in beach quality of urban and semi-urban beaches, obtained for the quality of the surrounding area sub-index (which values the degree of transformation of the surroundings), (i.e., 0.38/0.37/0.54 and 0.44/0.66/0.53, respectively) and environmental quality sub-index (i.e., 0.73/0.73/0.77 and 0.41/0.75/0.75, respectively) (Table 2), also did not appear to affect users' choice, although as it has been said before, landscape is a key factor for users. According to the results obtained, user decision to visit one beach is not so much affected by the small differences in the quality of those two sub-indices found among the beaches of the area of study. In the case of environmental quality, the differences are the consequence of the different level of cleaning services provided on urban and semi-urban beaches (i.e., urban beaches are cleaned more intensively). In semi-urban beaches, environmental quality is a bit lower. For all beaches in the area, it was found that beach users are satisfied with the quality of the surrounding areas (or landscape) (Roca et al., 2008).

4.1.2. Hedonic price index of houses and hedonic price index of hotels

The HP Index of Houses was positively related to Integral Quality of beaches measured by the BQI, although it is negatively related to RFI and NFI (Table 5). No relationship was found with PFI (which is reasonable, since the houses in the sites analyzed are not threatened by erosion, see below). Although in this case, the HP of Houses is related to the aggregated quality of the beach and the TCM was not; some of the relationships that are valid for that valuation apply in this case.

Except for the beach of the Malgrat Nord (particularly due to the fact that it is located at the mouth of the Tordera River), the HP Index of Houses was higher in areas located in the outskirts of the town than in urban areas. For this reason, results showed a negative correlation with Access, Parking Quality and Beach Safety Quality (higher in urban beaches). In the cases of Beach Use Quality and Natural Conditions Quality, negative correlation was explained by the fact that in the beaches of Malgrat Nord and S'Abanell (which have the lowest Hedonic values), beach use is not high, and both locations have moderate to well-established dune systems (the highest score of the beaches studied).

It is also interesting to note that no positive correlation was found between Quality of the Surrounding Areas and the HP Index of Houses. Although the landscape is a very important factor affecting the HP Index of Houses in many areas, differences in the

Table 5
Statistics of the correlation analysis done between economic valuation, quality and perception values.

Correlation		Coefficient	*R* value	Signification
STCM	RFI	Spearman	−1	Y
STCM	NFI	Pearson	−0.923	Y
YSTCM	IS	Kendall's tau	−1	Y
YSTCM	IN	Spearman	0.700	N
YSTCM	ISerF	Spearman	1	Y
STCM	IBS	Spearman	−0.700	Y
STCM	IEQ	Pearson	−0.972	Y
STCM	ISerF	Pearson	0.930	Y
		Kendall's tau	1.00	Y
STCM	IN	Spearman	0.800	Y
HP of houses	BQI	Spearman	0.714	Y
HP of houses	RFI	Spearman	−1	Y
HP of houses	NFI	Pearson	−0.713	N
HP of houses	IAcPar	Spearman	−0.808	N
HP of houses	IBS	Pearson	−0.912	Y
HP of houses	IC	Pearson	−0.961	Y
HP of houses	IN	Pearson	−0.981	Y
HP of hotels	BQI	Kendall's tau	1	Y
HP of hotels	IAcPar	Spearman	0.800	N
HP of hotels	IN	Spearman	−0.800	Y
Global evaluation	BQI	Pearson	0.856	Y
Global evaluation	PFI	Pearson	0.756	N
Global evaluation	IS	Pearson	0.779	Y
Global evaluation	IC	Pearson	−0.801	N

scores obtained in the sub-index Quality of the Surrounding Area sub-index have no significant effect on the HP Index of Houses. As in other studies (Pompe and Rinehart, 1994), no positive relationship was found between the HP Index of Houses and the beach protection sub-index. An explanation for this may be that erosion does not represent as big a threat for private property as elsewhere, due to calmer wave energy conditions. In spite of this fact, the chronic erosion problems existing in the beach of S'Abanell suggest the need for studying this question further. Also, it may be interesting to study the divergent scores found for the relationship between measures of recreation and HP. In our study, we did not find any positive relationship as has been found in other beach areas, with very different characteristics (Edwards and Gable, 1991).

The HP Index of Hotels was positively related to Integral Quality (Table 5). No relationship was found with any of the components. It was positively related to Access and Parking Quality and negatively to Natural Conditions Quality (Table 5). No relationship was found with any other sub-index. Results obtained for the Hedonic Price Index of Hotels may indicate that natural and landscape attributes do not increase prices for the area of study. Other factors may be controlling them. In this case, the crucial hypothesis of weak complementarity does not seem to hold for HP. Tourists staying in hotel rooms are those who prioritize proximity to the beach to quality of the landscape (Roca et al., 2008). On the other hand, most quality hotels are located at well-developed urban beaches, that have good access provisions. It is interesting to note that as in the case of HP of Houses, Integral Quality was also positively related to the HP Index of Hotels. It seems that HP Indexes are able to capture aggregated quality better than the TCM. Areas where beaches have a balanced combination of recreational conditions, natural attributes and proper sizes attract people that want to rent a house or to stay in a hotel. This finding is important for implementing the appropriate specification of different managerially relevant variables, since it suggests that users see that residents see recreational conditions, natural attributes and proper sizes as complements rather than substitutes. That is, they expect a more or less close match between the different attributes.

4.2. Beach user's perception vs. beach quality

All beach quality sub-indices (Tables 2 and 3) were also related to perception of users' measures described in the methods section (e.g., physical and morphological aspects, environmental aspects, aspects related to equipment and services, design and comfort aspects and global evaluation of beaches) (Roca et al., 2008). Although eight different items were used and related to quality measurements and economic valuations, the one that showed to be most relevant and, therefore, was included in the results section, is the global evaluation of each beach made by users. The global evaluation of beach quality made by beach users was well correlated with Integral Quality scores obtained through the BQI (Table 5). Users were able to appreciate the aggregated quality of beaches, as has been defined in the BQI. Global Evaluation by users was also positively correlated to PFI scores (Table 5). Users are not so much influenced by factors shown in PFI scores when deciding to visit a beach, but rather on the quality of the protection of human facilities (i.e., beach size), which is important in their global assessment.

Global evaluation was also positively correlated with the Quality of Surrounding Areas (Table 5). As in the previous case, for this region, the landscape did not condition the choice of users when deciding which beach to visit, but it is important for the global assessment. As it has been stated previously, other factors such as vicinity to the beach affect users' choice. On the other hand, a negative correlation was found between Global Evaluation and the scores of the Beach Crowding sub-index (beach use). Global evaluation was not so much affected (positively) by beach use. No other important correlations were found with most of the Recreational Function sub-indices. In the case of beach use, it has been found that high levels of occupancy do not necessarily imply low levels of satisfaction (Roca et al., 2008). Nevertheless, Whitehead et al. (2000) reported that willingness of people to pay is related to the recreational benefits of a fixed quality improvement. In the case of the valuation of beach protection, the study of Silberman and Klock (1998) concluded that willingness to pay was related to the beach width. Again, due to the fact that erosion in the area has not caused the severe effects suffered by other coastal areas (except for the beach of the S'Abanell), users are not so much influenced by it when choosing a beach.

4.3. Beach economic revenues vs. public investments

The use of valuation methods has also allowed the determination of the total monetary valuation that users have for each beach (Table 4). In order to interpret the monetary valuations presented in this section it is necessary to bear in mind the limitations highlighted in the previous sections regarding the methods used. Since they assume weak complementarity, the methods cannot attach a valuation to given characteristic when it is not possible to trace the behavior of individuals to changes in the characteristic analyzed. One must also keep in mind that the results obtained from each method refer to particular aspects of beach use. Thus, on the one hand, the TCM measures valuation by the users of the beach. On the other hand, HP measures valuation embedded in hotel and property prices. Moreover, both methods fail to take into account the existence, bequest and option values. Therefore, the valuations obtained from both the TCM and HP methods represent a lower bound to the actual social valuation.

Using the estimated Summer Travel Cost per user and data about beach use reported by Roca et al. (2008), the Consumer surplus (CS) was calculated (see Table 4) (the users' consumer surplus at the peak of beach use in the summer season). Lloret Centre was the beach with the highest valuation for users (199,217€). In the case of Lloret Centre, using daily accumulated beach use (Sardá et al., 2009), it was also possible to calculate the consumer surplus for all users visiting the beach in a single day. In the Lloret Centre, it was estimated that the consumer surplus amounted to 401,055 € by the users who go daily to the beach in the summer. Economic valuation by users including food and leisure activities in the moment of highest use was also calculated. In the case of Lloret Centre, the consumer surplus that considered food and leisure activities for a whole day was 828,554 €. For the Lloret Centre, the total consumer surplus in one day, in the peak of the summer by users was 1,229,609 €. The monthly consumer surplus for the month of August was 38,117,879 €. Using the commonly used indicator €/ha, the value found for the beach of Lloret Centre was 6,818,950 €/ha. On the other hand, for this research, the annual valuation by tourists staying in vacation rental homes was calculated using the HP method and we found that the increment in the prices of houses attributable to the beach of the Lloret Centre was approximately 788,000 € in 2004 (see Appendix D). Notice that it is not possible to add up the results obtained from each method, since then we would be the double counting the valuation attached to the beach by those individuals who stay at a hotel or at a property close to the beach.

Although consumer surplus generated by beaches is not collected by local managers, from a social point of view, it seems useful to compare local investment and economic valuation. Although the limitations of the methods used must be borne in

mind, this comparison provides an approximation to cost–benefit analysis. In the municipality of the Lloret de Mar, in 2004, the local government spent approximately 845,000 € in beach management and maintenance for all the beaches. It also spent an estimated 140,000 € in sediment works that year (Ariza et al., 2008). As it can easily be seen, the economic valuation calculated only using the TCM for one day (in the peak of the summer) of just one beach (Lloret de Centre-1,229,609 €) is enough to compensate the annual investment made by the local government in all beaches of the municipality. On these grounds, investing in beaches provides high returns from a social point of view. Values found for the month of August for the beach of the Lloret Centre (approximately 38,117,879 € or 6,818,950 €/ha) are very high. They are much higher than the values found in other similar studies in different coastal areas for the whole season (324 US$/ha year (2009) in Edwards and Gable, 1991; 511.81 US$/ha year (2004) in Silberman et al., 1992; 121,420 €/ha year (2009) in Falk et al., 1994; 38,743 €/ha year (2009) in Leeworthy and Bowker, 1997; 93,536 US$/ha year (2004) in Kline and Swallow, 1998; 1791 US$/ha year (2004) in Taylor and Smith, 2000; 66,346 €/ha year (2009) in Machado and Mourato, 2002). This may be related to the fact that the intensity of beach use in the Northwestern Mediterranean may be higher than in other coastal locations. These finding should be considered in future studies valuing beach services in the area. Extrapolations of beach recreational value from other sites should be made with caution. The fact that the economic valuation attributed by users to beaches is much higher than investment and the relationships among beach attributes and economic methods are facts likely to be common for many coastal areas of the world. However, it is also true that those differences are also affected by specific local dynamics. Both common patterns and general specificities should be considered in future studies of beach management.

With the results obtained when valuing beaches from an economic point of view, it seems reasonable to suggest the possibility of implementing a kind of "beach management tax." The establishment of such a tax may be especially interesting for protecting landscape and natural communities. So far, attitudes of the Government towards them have been quite skeptical reactive. An important sum of money provided by "beach management tax" could allow the establishment of more proactive measures, such as land purchase or the implementation of natural communities and public participation research programs. This would allow the change of focus of beach management in the area, from a short-term satisfaction of users, to a socio-ecological system conservation. On the other hand, in some beaches it may be preferable to establish policies to reduce beach use (e.g., regulating urbanization, means of transportation and parking), if the improvement in the quality of some aspects is not compatible with the current number of users.

Such a tax could take on many forms (see, for instance, Gago et al., 2009; Palmer Tous and Riera Font, 2003; Palmer Tous et al., 2007). For instance, it could be raised on some kinds of private business transactions, services or sales used by beach users and related to the use of beaches. Additionally, it could be charged directly to the users of the beach. In both cases, the effects of the tax would be double. On the one hand, it would represent a source of revenue for municipalities. This way, part of the profits of tourism and beachgoers Consumer Surplus could be invested in maintaining and improving some important beach aspects of the area, such as beach use, safety, quality of the surrounding area and natural conditions (Ariza et al., 2010). On the other hand, such a tax could help regulate use of beaches using incentives/disincentives.

However, determining the specific optimal type of tax is not possible at this level of generality, without considering the specific goals of the policymakers, the specific characteristics of the demand and supply sides and the possible relationships of complementarity and substitution between private business, services or sales on the one hand, and beach use on the other.

The analysis of investment-valuation decisions using HP is also important. Considering the results obtained by Rigall-Torrent et al. (2011), the total annual valuation by tourists staying in hotels at the municipality (Lloret de Mar) for a beach in 2002 was estimated to be 4,239,000 €. Again, this value is higher than the total amount invested for beach management in the municipality. Therefore, part of this valuation could be collected for improving beach quality. Likewise, the valuation by tourists staying in vacation rental at the beach of Lloret Centre (estimated at 788,000 €) also supports this argument. Notice, however, authorities should be very careful when implementing taxes in order to avoid double taxation to those users of the beach who stay at a hotel or who own a nearby property.

5. Conclusions

Of the three of non-marketed valuation methods for beaches used in this research, only the hedonic price of houses and hotels was positively related to Integral Quality measured by the BQI. In contrast, the TCM (Summer and Yearly) was not. Components were not positively related to any of the methods used. There are a lot of beach attributes that are not included in the valuation performed by the analyzed methods, confirming the arguments used by Diamond and Hausman (1994) regarding contingent valuation as well as the need to check that the weak complementarity hypothesis holds. In fact, few sub-indices showed positive relationships with the methods used. Service and Facilities Quality is the one often related to the methods used for this research. Other positive correlations were found with Access and Parking Quality and Natural Conditions Quality.

The results obtained in this research show that the current valuation methods have no positive relationship with many important beach quality attributes. Obtained values are only loosely related to quality. Monetary values alone are not able to provide integrated valuations of beaches. Besides, methods are used to reflect different things. For example, Hedonic Prices Indexes of houses seem to be subjected to factors such as supply/demand of housing rather than to beach quality. Neither the TCM nor HP take into account the existence, bequest and option values. Therefore, we recommend that beach valuation are performed in a more integral way, using multi-criteria analysis, which take into account a wider variety of relevant elements. They have been used by some authors as a rich framework for decision-making. They could likewise be applied to beach management research. The use of multi-criteria analysis would allow considering economic valuations made with the TCM and the HP, along with many other aspects of beaches such as landscape, natural quality or physical quality measurements.

As a final reflection, it is suggested to use the results and conclusions of the present research appropriately. Beach and dune environments are one of the most valuable natural systems in many coastal areas (Bell and Leeworthy, 1990; Pompe and Rinehart, 1994; Shivlani et al., 2003; Brenner et al., 2010). This study may be useful for managing beaches that include areas with similar coastal characteristics. Much of the data obtained and relationships among many aspects of beaches were established for the first time, and it is recommended that further studies increase the number of studied beaches in order to extend the conclusions obtained in the present study to different coastal areas. We studied beaches with different characteristics, that are subjected to the same socio-economic dynamics. Patterns of use and human pressures are the same for all the beaches in the region. It may be interesting to test the relationship between Integral Quality of beaches, its different

attributes and traditional economic valuation methods in other coastal areas. As a final recommendation, it also would seem very worthwhile to develop more studies that include the relationship of economic valuation methods and integral quality of natural beaches.

The present paper has also demonstrated that for the study area, users' valuation for beaches far exceeds investment made by local managers. For that reason, it has been suggested that some of the users'/consumers' surplus attributable to beaches could be collected and reinvested to improve the weakest quality aspects of each beach.

Acknowledgements

This work has been carried out within the framework of different projects funded by the Spanish Ministry of Research and Innovation (REN2003-09029-C03-MAR (Mevaplaya), CGL2006-13953-C04 (DEFCON-EEP), CSO2009-14589-C03 (Mevaplaya-II) and CTM2008-05597/MAR (VuCoMA)). The first author was supported by a Fulbright fellowship from the Fulbright Commission. The authors wish to thank all scholars who participated in the discussion sessions and the experts and users that answered the surveys.

Appendix A. Supplementary material

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.ocecoaman.2012.04.002.

References

Ariza, E., Jiménez, J.A., Sardá, R., 2008. A critical assessment of beach management on the Catalan Coast. Ocean & Coastal Management 51, 141–160.

Ariza, E., Jiménez, J.A., Sardá, R., Villares, M., Pintó, J., Fraguell, R., Roca, E., Martí, C., Valdemoro, H., Ballester, R., Fluvià, M., 2010. Proposal for a Beach Integral Quality Index for urban and urbanized beaches. Environmental Management 45 (5), 998–1013.

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

Benson, E.D., Hansen, J.L., Schwartz Jr., A.L., Smersh, G.T., 1998. Pricing residential amenities: the value of a view. Journal of Real Estate Finance and Economics 16 (1), 55–73.

Bird, E.C.F., 1996. Beach Management. Wiley, Chichester, UK.

Bover, O., Velilla, P., 2002. Hedonic house prices without characteristics: the case of new multiunit housing. Working Paper Series No. 117. European Central Bank.

Brenner, J., Jimenez, J.A., Sardá, R., Garola, A., 2010. An assessment of the non-market value of the ecosystem services provided by the Catalan coastal zone, Spain. Ocean & Coastal Management 53 (1), 27–38.

Cervantes, O., Espejel, I., 2008. Design of an integrated evaluation index for recreational beaches. Ocean & Coastal Management 51 (5), 410–419.

Chay, K.Y., Greenstone, M., 2005. Does air quality matter? Evidence from the housing market. Journal of Political Economy 113 (2), 376–424.

De Groot, R.S., Wilson, M.A., Bouman, S.R.M.J., 2002. A typology for the classification, description and valuation of ecosystem functions, goods and services. Ecological Economics 41, 393–408.

Diamond, P.A., Hausman, J.A., 1994. Contingent valuation: is some number better than no number? Journal of Economic Perspectives 84, 45–64.

Edwards, S.F., Gable, F.J., 1991. Estimating the value of beach recreation from property values: an exploration with comparisons to nourishment costs. Ocean and Shoreline Management 15 (1), 37–55.

Espinet, J.M., Saez, M., Coenders, G., Fluvià, M., 2003. Effect on prices of the attributes of holiday hotels: a hedonic prices approach. Tourism Economics 9 (2), 165–177.

Falk, J., Graefe, A., Suddleson, M., 1994. Recreational Benefits of Delaware's Public Beaches: Attitudes and Perceptions of Beach Users and Residents of the Mid-Atlantic Region. University of Delaware Sea Grant College Program, University of Delaware, Newark, DE.

Fleming, C.M., Cook, A., 2008. The recreational value of Lake McKenzie, Fraser Island: an application of the travel cost method. Tourism Management 29 (6), 1197–1205.

Gago, A., Labandeira, X., Picos, F., Rodríguez, M., 2009. Specific and general taxation of tourism activities. Evidence from Spain. Tourism Management 30, 381–392.

Haab, T.C., McConnell, K.E., 2002. Valuing Environmental and Natural Resources: The Econometrics of Non-Market Valuation. Edward Elgar Publishing, Cheltenham.

Hamilton, J.M., 2007. Coastal landscape and the hedonic price of accommodation. Ecological Economics 62 (3–4), 594–602.

Haroutunian, S., Mitsis, P., Pashardes, P., 2005. Using brochure information for the hedonic analysis of holiday packages. Tourism Economics 11 (1), 69–84.

James, R.J., 2000. From beaches to beach environments: linking the ecology, human-use and management of beaches in Australia. Ocean & Coastal Management 43, 495–514.

Kline, J.D., Swallow, S.K., 1998. The demand for local access to coastal recreation in southern New England. Coastal Management 26, 177–190.

Krutilla, J.V., 1967. Conservation reconsidered. The American Economic Review 57 (4), 777–786.

Leeworthy, V.R., Bowker, J.M., 1997. Non-market economic user values of the Florida keys/key west. In: Linking the Economy and the Environment of Florida Keys/Florida Bay. NOAA, SEA Division, National Ocean Service, 41 p.

Machado, F.S., Mourato, S., 2002. Evaluating the multiple benefits of marine water quality improvements: how important are health risk reductions? Journal of Environmental Management 65, 239–250.

Martinez-Alier, J., Munda, G., O'Neill, J., 1998. Weak comparability of values as a foundation for ecological economics. Ecological Economics 26, 277–286.

Micallef, A., Williams, A.T., 2003. Application of function analysis to bathing areas in the Maltese Islands. Journal of Coastal Conservation 9, 147–158.

Micallef, A., Williams, A.T., 2004. Application of a novel approach classification in the Maltese Islands. Ocean & Coastal Management 47, 225–242.

Palmer Tous, T., Riera Font, A., 2003. Tourism and environmental taxes. With special reference to the "Balearic ecotax". Tourism Management 24, 665–674.

Palmer Tous, T., Riera Font, A., Rosselló Nadal, J., 2007. Taxing tourism: the case of rental cars in Mallorca. Tourism Management 28, 271–279.

Parsons, G.R., 2003. The travel cost model. In: Champ, P.A., Boyle, K.J., Brown, T.C. (Eds.), A Primer on Nonmarket Valuation. Kluwer Academic Publishers, Dordrecht, pp. 269–329.

Pompe, J.J., Rinehart, J.R., 1994. Estimating the effect of wider beaches on coastal housing prices. Ocean & Coastal Management 22 (2), 141–152.

Randall, A., 1994. A difficulty with the travel cost method. Land Economics 70 (1), 88–96.

Riera Font, A., 2000. Mass tourism and the demand for protected natural areas: a travel cost approach. Journal of Environmental Economics and Management 39 (1), 97–116.

Rigall-I-Torrent, R., Fluvià, M., 2007. Public goods in tourism municipalities: formal analysis, empirical evidence and implications for sustainable development. Tourism Economics 13 (3), 361–378.

Rigall-I-Torrent, R., Fluvià, M., 2011. Managing tourism products and destinations embedding public good components: a hedonic approach. Tourism Management. doi:10.1016/j.tourman.2009.12.009.

Rigall-Torrent, R., Fluvià, M., Ballester, R., Salo, A., Ariza, E., Espinet, J.M., 2011. The effects of beach characteristics and hotel location with respect to the beach on hotel prices. Tourism Management 32 (5), 1150–1158.

Roca, E., Riera, C., Villares, M., Fragell, R., Junyent, R., 2008. A combined assessment of beach occupancy and public perceptions of beach quality: a case study in the Costa Brava, Spain. Ocean & Coastal Management 51 (12), 839–846.

Roca, E., Villares, M., 2008. Public perceptions for evaluating beach quality in urban and semi-natural environments. Ocean & Coastal Management 51 (4), 314–329.

Roca, E., Villares, M., Ortego, M.I., 2009. Assessing public perceptions on Beach quality according to Beach users' profile: a case study in the Costa Brava (Spain). Tourism Management 30 (4), 598–607.

Rosen, S., 1974. Hedonic prices and implicit markets: product differentiation in pure competition. Journal of Political Economy 82 (1), 34–55.

Saló, A., 2005. Estudi sobre l'habitatge a la demarcació de Girona: habitatges principals, segones residències i apartaments turístics [Analysis of housing in Girona province: main homes, second homes and tourist apartments]. PhD dissertation, Universitat de Girona, Girona.

Saló, A., Garriga, A., 2011. Second home rental market: hedonic analysis of the effect of different characteristics and high-market-share intermediary on price. Tourism Economics 17 (5), 1017–1033.

Sardá, R., Mora, J., Ariza, E., Ávila, C., Jiménez, J.A., 2009. Decadal shifts in sand availability per beach user in the Costa Brava (Catalan Coast, North-western Mediterranean Sea). Tourism Management 30, 158–168.

Shivlani, M.P., Letson, D., Theis, M., 2003. Visitor preferences for public beach amenities and beach restoration in South Florida. Coastal Management 31 (4), 367–385.

Silberman, J., Klock, M., 1998. The recreation benefits of beach renourishment. Ocean and Shoreline Management 11 (1), 73–90.

Silberman, J., Gerlowski, D.A., Williams, N.A., 1992. Estimating existence value for users and non-users of New Jersey beaches. Land Economics 68, 225–236.

Taylor, L.O., Smith, V.K., 2000. Environmental amenities as a source of market power. Land Economics 76, 550–568.

Thrane, C., 2005. Hedonic price models and sun-and-beach package tours: the Norwegian case. Journal of Travel Research 43, 302–308.

Whitehead, J.C., Haab, T.C., Huang, J.C., 2000. Measuring recreation benefits of quality improvements with revealed and stated behavior data. Resource and Energy Economics 22 (4), 339–354.

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