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Divers' willingness to pay to visit marine sanctuaries: an exploratory study[☆]

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Abstract

Entrance fees paid by divers to enter marine sanctuaries constitute a significant potential revenue source to finance coral reef conservation. An exploratory contingent valuation study was carried out among foreign and local tourists in three major dive destinations in the Philippines to examine diver demand for visits to protected coral reef areas. Results indicate that most divers would be willing to pay an entrance fee to marine sanctuaries where fishing, one of the major threats to coral reefs, is prohibited. An econometric model was estimated analyzing the socioeconomic and travel related factors that affect divers' willingness to pay. Results indicate that substantial amounts of revenues may be collected through entrance fees to support coral reef conservation. Most tourists interviewed preferred NGOs as the most trustworthy organization type to collect and manage entrance fees. © 2002 Elsevier Science Ltd. All rights reserved.

1. Introduction

Coral reefs are important natural resources that contribute significantly to human welfare at the local, national and global levels. The most important benefits include provision of a protected area for young fish, which leads to enhanced fish stock available to humans; coastal protection; use in pharmaceuticals and potential as valuable genetic resources; and recreation opportunities for divers from around the

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world and the resulting increased tourism revenues for reef rich countries.¹ Nevertheless, coral reefs are under considerable threat generated by human activities, including destructive fishing, sedimentation due to increased human settlement in coastal regions, pollution, coral mining for sale as souvenir or for use as construction materials; and direct damage due to careless behavior by divers [2]. The degradation of coral reefs leads to economic loss to nearby communities and to the global community.

Dive tourism has received increased attention for its promising role in financing coral reef conservation [3–5]. By creating business and employment opportunities in tourist services (resorts, restaurants, dive shops, and souvenir shops), it provides an alternative to destructive fishing methods for the local community. Moreover, dive tourism gives local communities an incentive to actively conserve coral reefs by establishing marine sanctuaries and installing reef protection facilities, such as anchor buoys.² This helps secure the continued inflow of tourism revenues in the long run. Nevertheless tourism itself may also negatively influence coral reefs by encouraging the mining and sale of corals as souvenirs, increasing pollution and coastal construction activities and through direct destruction due to reckless diving [5].³

Located in the world's richest region in terms of marine biodiversity, the Philippines has more than 400 coral reef species and about a thousand associated fish species [7]. This richness has also been the basis for reef fishing providing livelihood for more than one million small-scale fishers [8]. Unfortunately, Philippine coral reefs have been seriously threatened by over-fishing, coral mining, sedimentation, pollution and volcano eruptions. The rapid growth in marine related tourism and associated coastal development brought with it are also partly responsible for reef degradation [9]. Nevertheless, tourism has also been a promising factor by providing local communities with employment and business opportunities as an alternative to destructive fishing and coral mining. Recognizing the need for conservation of coral reefs to ensure continued flow of visitors, there have been private initiatives by local dive resorts to designate certain areas as reserves and to prohibit fishing.

One way to finance marine reserves is to charge an entrance fee. This is a way for local communities to capture the scarcity rent of their resource. Revenues thus collected would help cover maintenance and anti-fishing rule enforcement costs of a marine reserve. Furthermore, the entrance fee may be used as a tool to regulate the number of visitors to minimize diver damage. This paper presents the findings of an exploratory study on diver demand for visiting a marine sanctuary in the Philippines. It reports the results of a pilot survey among international divers on their maximum willingness to pay (WTP) to enter a marine sanctuary. Furthermore, it identifies

¹Spurgeon [1] provides a comprehensive list of the economic functions of coral reefs and categorizes their values from a natural resource use point of view.

²Anchor buoys are floating objects to which boats are tethered so as to prevent reef destruction associated with dropping of boat anchors.

³Dive masters play an important role in educating divers to become more careful not to destroy underwater life while they dive. Nevertheless, a recent survey among Philippine dive masters showed that less than one third of them talk about reef management issues in pre- or post-dive briefings [6].

factors that affect the level of WTP. Finally, it estimates potential revenues from entrance fee collection.

2. Previous literature on coral reef valuation

Methods available to assess the tourism value of coral reefs may be categorized as market based and non-market techniques. Non-market methods include indirect (travel cost) and direct (contingent valuation) measures. There are relatively few studies on the tourism value of coral reef conservation⁴ despite the growing recognition of eco-tourism's role in sustainable management of these resources.⁵

Market-based approaches involve the estimation of the benefits and costs from a marine sanctuary through the use of prices and quantities observed in the market. Benefits are generally calculated as the present value of revenue flows due to dive tourism. This value is usually also adjusted by a multiplier to account for the ripple effects of first hand transactions by tourists on related sectors of the local economy [10]. Market based valuation of the tourism function of coral reefs has been carried out by Hodgson and Dixon [11], Dixon et al. [5] and Cesar [2].

The travel cost method (TCM) relies on the cost of travel to the site as the price of the recreation, since most of the time the entrance fee to such recreation areas is nominal. Saunders et al. [12] used this approach to value recreation services of the Bunaken National Marine Park in Indonesia in 1996. They found that non-local tourists derived a recreational value of about US\$328 per person per year from visiting the park. When aggregated to all non-local tourists, a total recreation value of US\$4.2 million per year was estimated. Pendleton [13] found that environmental quality, topography and time to a dive site were significant predictors of dive site visitation in the Sandy Bay/West End Marine Reserve in the Honduran Bay Islands.

The contingent valuation method (CVM) employs hypothetical questions to elicit respondents' maximum WTP for a specified change in an environmental amenity. The responses represent a direct expression of the value of the amenity. Value is elicited through the construction of a specific and realistic scenario. This is achieved by clearly stating what the environmental good and its substitutes are, where and how it will be provided, what agency will collect the payment and how the collected funds will be used to provide the environmental good [14–16]. Dixon et al. [5] complemented their market based valuation study of the Bonaire Marine Park by conducting a survey among diver tourists leaving the area to elicit their WTP fees for the park. They found that an overwhelming 92% of tourists interviewed agreed that an entrance fee system was reasonable and would be willing to pay the proposed rate of US\$10/diver/year. Moreover, the authors reported that 48% of their respondents expressed a WTP at least US\$30 per year.

⁴The total number of valuation studies on all uses of marine protected areas, including fisheries, mangroves, beaches, is bigger. An extensive review is provided by Hoagland et al. [10].

⁵Cesar [21] provides a review of various aspects of coral reef economics.

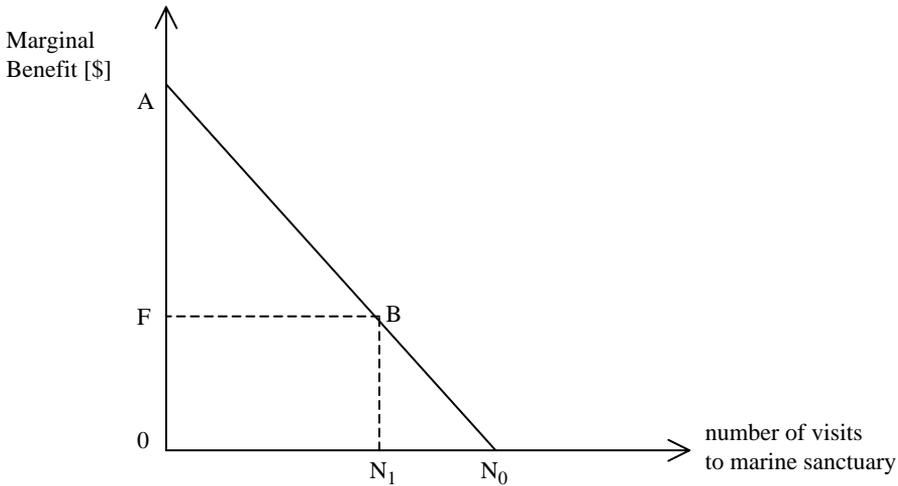


Fig. 1. Demand for dive trips to a marine sanctuary.

3. Conceptual framework

In this study, the maximum WTP for an entrance fee to enter a marine sanctuary was modeled and elicited through a survey. The maximum WTP is defined as the amount that would make the respondent indifferent between not paying an entrance fee and thus not diving at all in the marine sanctuary, and paying the fee and enjoying his optimal number of dives there. The maximum WTP is modeled as a function of age, gender, income, level of education, general interest in environmental protection, Philippine residency and type of diving (scuba or snorkel).

Fig. 1 depicts the relationship between demand for dive trips to a marine sanctuary, WTP and number of dive trips. Each point on the demand curve represents the marginal benefit derived from an additional dive trip to the marine sanctuary. The area under the demand curve gives the total benefit derived from all dive trips. For example, the total benefit that a diver derives from making N_0 visits to a marine sanctuary that does not charge an entrance fee can be represented by the triangle AN_00 . This is also the maximum amount that the diver would be willing to pay in order to complete N_0 dives in the marine sanctuary. This surplus is a potential source of revenue that conservationists may obtain by instituting an entrance (user) fee.

The institution of an entrance fee F for a marine sanctuary would be expected to decrease the number of trips a diver makes to a marine sanctuary, from N_0 to N_1 .⁶

⁶The degree of the decrease depends on the price elasticity of demand, which is likely very small. This expectation is based on the insignificant magnitude of an entrance fee compared to the large expense of travelling to a reef rich destination and the cost of dive equipment, which can amount to several thousands of US dollars.

Box 1

Question eliciting information on tourists' WTP entrance fee^a

How much would you be willing to pay as a daily, per person entrance fee to a marine sanctuary where fishing is prohibited, in addition to the other costs of the trip?

—P/US\$0, —P 25/US\$1, —P 75/US\$3, —P 125/US\$5, —P 250/US\$10, —other (please specify) P———/US\$———

^aThis version of the WTP questions was used in Mactan and Panglao. Due to the exploratory nature of this study, the question used in Anilao was slightly different and read: “Would you be willing to pay a daily entrance fee to a marine sanctuary in Anilao that will be used towards the preservation of coral reefs? If YES, how much? P 25—, P 75—, P 125—, P 250—, other P———”

Now the total benefit derived by the diver is represented by the area ABN_1O . However, the diver pays entrance fees equal to the area FBN_1O .

Ideally, the conservationist would like to retain all the surplus benefit as revenue. However, this would require that a different entrance fee is instituted for each diver equal to her maximum WTP, which is itself administratively a very costly, if not impossible task. Instead, the protected area administrator will choose to levy a fee that maximizes total revenues.

The maximum WTP of each diver was elicited through the Contingent Valuation question, which is reproduced in Box 1. It was designed to elicit divers' maximum WTP an entrance fee for a dive trip to a marine sanctuary near the resort area where they were vacationing. (A typical dive trip is day-long, starting around 10 am and ending at around 3:30 pm and consists of two dives, one before and one after lunch. Night dives, which are far less frequent than day dives, were ignored in this study.) The question makes it clear that diving in a marine sanctuary is only possible if an entrance fee is paid. Moreover, the information on fishing being prohibited in a marine sanctuary implies higher reef quality than in unprotected areas. As in the conceptual model, the WTP question also assumes that the optimal number of dive trips is predetermined and inelastic with respect to small changes in the cost of the dive trip, such as through the introduction of a US\$1–10 entrance fee.

The contingent valuation question in Box 1 is of the format known as a “payment card.” Other commonly used formats include discrete choice (yes/no) and open-ended. Each of the formats has advantages and disadvantages.⁷ The CV question used in this survey provides a limited description of the hypothetical scenario. Although the question did not specify exactly where the marine sanctuary was located, the location was implied by the preceding questions. The WTP question was preceded by a set of five questions on the state of coral reefs near the hotel where the respondent was staying in this site, the causes of deterioration (if the respondent reported observing degradation) and the negative and positive effects of tourism on coral reefs in the area. Hence, it was clear in the context of the survey that the marine sanctuary in question was one near the survey site. The CV question did not specify what organization would manage the funds collected and for what purpose these

⁷While the referendum method is the most widely used answer format, the payment card continues to be used in published studies. A three way comparison of payment card, referendum and open-ended formats for valuing habitat protection found consistency in WTP estimates across the alternative formats [17].

funds would be used, but a follow-up question addressed the preferred type of marine reserve management organization.

4. Data collection

A pilot survey was carried out among diver tourists on and near Anilao, Batangas; Mactan Island, Cebu and Alona Beach, Bohol during the summer months of 1997. In addition to questions on the WTP to enter a marine sanctuary, the survey sought to elicit information on the type of organization to which divers would prefer to make payments (entrance fees), their opinions on the state of coral reefs in these resort areas, other environmental and tourist features of the study-locations, the cost of the diving trip and the respondents' socio-economic characteristics. The final sample sizes were 37 in Anilao and 46 each on Mactan Island and on Alona Beach.

The sampling population for the study was established as "tourists (local and international) who dive (SCUBA or snorkel) while in the resort area". Non-probability, convenience sampling was selected as the most appropriate way to access this population given the limited time and resources available for survey implementation. Tourists were approached in dive shops, resort lobbies and cafés or while strolling along the streets. The mode of questionnaire administration was mixed, namely in-person, self-administered, or a combination, depending on the situation and the respondent's interest in clarifying questions.

5. Survey findings

5.1. Sample characteristics

The survey results indicate that the three study sites, Anilao, Mactan Island and Alona Beach, attract different types of diver visitors (see Table 1). Anilao, due to its proximity to Manila (about 120 km) has been known as a destination for weekend

Table 1
Dive tourists sample characteristics (standard deviation in parentheses)

	Anilao	Mactan Island	Alona Beach
Philippine resident	97.3%	10.9%	15.5%
Average length of stay at location (days)	1.95 (0.47)	4.8 (4.6)	12 (12.5)
Average number of Dive Days	1.85 (0.36)	3.1 (6)	6.5 (9.1)
Average monthly income (in US\$)	NA	4,663 (5,235)	1,694* (1,296)
Male	54.1%	61.4%	71.1%
Average age	36.2 (10.8)	31.4 (9.3)	30.9 (7.7)
College educated	89.2%	60.9%	61.7%
Travel expenditures (US\$)	NA	928.1 (592.7)	1431.0 (874.6)

*Question specifically asked for "after-tax income".

Table 2

Willingness to pay to enter a Philippines marine sanctuary (Daily, per person)

	Philippine Anilao (<i>n</i> = 37)	Mactan Island (<i>n</i> = 39)	Alona Beach (<i>n</i> = 44)
Average WTP (US\$)	3.7	5.5	3.4
Std. deviation (US\$)	2.4	6.8	3.1
Median (US\$)	3	5	3
WTP ≥ US\$0	100%	100%	100%
WTP ≥ US\$1	96%	95%	89%
WTP ≥ US\$2	80%	64%	64%
WTP ≥ US\$3	75%	62%	59%
WTP ≥ US\$4	40%	51%	36%
WTP ≥ US\$5	32%	51%	36%
WTP ≥ US\$10	8%	31%	9%
WTP ≥ US\$15	0%	3%	2%
WTP ≥ US\$40	0%	3%	0%

getaways for Manila residents. Confirming this, 95% of the divers surveyed in Anilao reside in Metro Manila, their average length of stay is 1.95 days with little dispersion around this mean⁸ (Table 1). Mactan Island's reputation as a relatively up-scale short vacation destination mainly for tourists from East and South East Asia is also confirmed. The average length of stay was 4.8 days with little deviation from the mean. The average monthly income and total travel expenses were US\$4,663 and US\$928, respectively. In contrast to Mactan Island, Alona Beach is known as a destination for back-packers and other divers looking for bargain prices. Divers at Alona Beach came from a wide range of countries of residence: 13% reside in South East Asia (Philippines and Singapore), 20% in East Asia (Japan, Hong Kong and Taiwan) and the rest in Europe. The average length of stay on Alona Beach was 12 days. The average monthly after-tax income and total travel expenses were US\$1,694 and US\$1,431, respectively.

The gender composition of the samples differed somewhat. In Anilao 54.1% of the respondents were males; on Mactan Island this percentage was 61.4% and on Alona Beach 71.1%. There was little variation in average age across resort areas. The average age was 30.9 on Alona Beach, 31.4 on Mactan Island and 36.2 in Anilao (Table 1).

5.2. *WTP an entrance fee to marine sanctuary*

Table 2 reports for each resort area the average WTP among divers to enter a marine sanctuary for one day. The average WTP is considerably higher on Mactan

⁸The fact that the survey in Anilao was conducted during the weekend may have biased the sample towards weekend divers. However, this finding is in line with evidence gathered from conversations with resort owners in the area stating that most of the divers in Anilao come on weekends.

Table 3
Preferred type of organization for receipt of entrance fees^a

	Anilao (<i>n</i> = 36)		Mactan Island (<i>n</i> = 35)		Alona Beach (<i>n</i> = 43)	
National government agency	2	5.6%	2	5.7%	1	2.3%
Tourism association	6	16.7%	9	25.7%	4	9.2%
Local government (Municipality)	1	2.8%	1	2.9%	2	4.6%
Environmental NGO	25	69.4%	19	54.3%	20	46.5%
Fishing community	6	16.7%	4	11.4%	10	23.2%
Other	0	0	0	0	9	20.9%

^a In Anilao respondents were asked to rank the organizations. The organization(s) with the highest rank were taken as the “most preferred organization”. On Mactan Island and Panglao Island, although the question instructed to check only one of the choices, several respondents checked more than one of the organizations. In such cases all of the organizations were considered as “most preferred”. As a result, the sum of the percentages exceeds 100.

Island than in Anilao and Alona Beach. As can be seen, the average WTP was US\$3.7 in Anilao, US\$5.5 on Mactan and US\$3.4 on Panglao. However, pair-wise *t*-tests revealed no statistically significant difference among the means.⁹ The average WTP estimated from the Mactan sample ranks lower in reliability than those in the Anilao and Alona Beach samples as evidenced by the high standard deviation in the former. Table 2 also provides a percentage distribution for WTP amounts between US\$1–4. As expected, in all three resort areas, the percentage of people willing to pay a certain minimum fee decreases as the fee amount increases. Table 2 also reports the percentage of respondents willing to pay the various offered amounts.

5.3. Preferred organization

Respondents also asked which type of organizations they would prefer to manage the entrance fee revenues, namely “national government agency”, “an environmental NGO”, “local tourism association”, “a fishing community”, “local government (municipality)” or other. As Table 3 indicates, “an Environmental NGO” was the organization that most tourists in all three resort areas wanted to manage the entrance fee revenues, while government agencies at the local and national levels were the least trusted by the respondents.

⁹ The *t*-scores found in the two-sided difference of means tests are -1.53 for the pair Anilao/Mactan (d.f. 74), 1.75 for Mactan/Alona (d.f. 81) and -0.48 for Anilao/Alona (d.f. 79). These scores indicate that there is no statistically significant difference among the means at $\alpha = 0.025$.

Table 4
List of variables

Log (WTP)	WTP
Log (age)	Natural logarithm of age
Gender	Male (=0) or Female (=1)
College	Not college educated (=0) or college educated (=1)
Alona	Anialo or Mactan Island (=0), Alona Beach (=1)
Anilao	Alona Beach or Mactan Island (=0), Anialo (=1)
Log (travelcost)	Natural logarithm of cost of the trip (entire trip to the Philippines in case of non-residents, trip to the location in case of residents)

6. Econometric analysis

The WTP questions were in the payment card format (Box 1) in which respondents were asked to choose a value among an ordered set of threshold values or to specify another value. It is presumed that the adjacent WTP values on the payment card represent ranges of WTP values containing the true underlying WTP* of the respondent. WTP* is hypothesized to be influenced by a number of independent variables, represented by the vector \mathbf{x} .

$$\text{WTP}_i^* = \beta' \mathbf{x}_i + \varepsilon_i, \quad (1)$$

where β is a vector of slope parameters and \mathbf{x}_i is a vector of observations on the explanatory variables for individual i . The error term ε_i is assumed to be a normally distributed random variable with mean zero.

A completely censored regression model was fitted in order to avoid problems that an ordinary least squares (OLS) regression may cause when the dependent variable is a dummy variable. It has been shown that an OLS procedure that employs interval midpoints as proxies for the true dependent variable can yield biased parameter estimates, misleading inferences regarding the effects of different variables on WTP and biased estimates on the overall resource value [18].

The independent variables used in this model are age, gender, college education, Alona, Anilao, resident and cost of travel to the Philippines (Table 4). A log-normal distribution was assumed for the independent variable, WTP*, as well as for age and travel expenditures leading to a double log model except in the dummy variables.

In the completely censored regression model, the probability that WTP* falls in the range defined by the lower limit t_{li} and the upper limit t_{ui} , represented by the adjacent payment card value is given by

$$Pr(\log w_i \subseteq (\log t_{li}, \log t_{ui})) = Pr(\log t_{li} - \mathbf{X}'_i \beta) / \sigma < z_i < Pr(\log t_{ui} - \mathbf{X}'_i \beta) / \sigma), \quad (2)$$

where z_i is the standard normal random variable. Because the probability given by the above equation can be written as the difference between two standard cumulative densities, a likelihood function can be defined over the parameters β and σ . The "GROUPED DATA" procedure in the LIMDEP econometric package is used to estimate the parameters.

Table 5
Coefficient estimates

Variable	Coefficient	<i>t</i> -value
Constant	4.90	4.20
Log (age)	-0.26	-0.77
College	0.77	3.98
Gender	-0.26	-1.42
Alona	-0.39	-1.98
Anilao	-0.54	-0.23
Log (travel cost)	0.42	1.34

Table 5 indicates the effects of the variables on the dollar WTP amount selected by the respondents. The estimated regression coefficients for the payment card responses are marginal impacts on the dollar amount that the respondents are willing to pay.

Two of the estimated coefficients, namely those for the dummy variables of College and Panglao, are significant at $\alpha = 0.05$. College education is associated with a higher level of WTP entrance fee to a marine sanctuary. This estimation result accords with the expectation that higher education increases environmental awareness and thus the willingness to contribute to conservation efforts. Staying on Alona Beach is associated with a lower WTP the entrance fee than on Mactan Island. This result may at first be surprising in light of the fact that Alona Beach has the highest quality coral reefs among the three survey locations. One would expect higher WTP to assure conservation of such quality reefs. However, the lower WTP on Alona Beach can be plausibly explained by the lower income levels of the visitors there than on Mactan Island (Table 1). Thus the estimated coefficient may be reflecting the effect of income on WTP.¹⁰ A similar explanation may be plausible for the negative sign of the estimated coefficient of the dummy variable for Anilao, which is mainly visited by domestic tourists. However, this coefficient estimate is not significant. This also suggests that the slight difference in the survey instrument from that used on Mactan and Alona Beach and the fact that nearly all of Anilao's visitors are Philippine residents did not significantly effect WTP.

The signs of the coefficients for the logarithm of age and the logarithm of travel expenditures are as expected. Younger people are likely to have greater inclination to donate to environmental preservation. If we consider travel expenditures as a proxy for income and assume that preservation of coral reefs is a normal good, then we would expect that the higher income the higher the WTP entrance fee. The modest number of observations (107) is likely to be an important reason for the low *t*-scores of the variables like age, gender and travel cost.

¹⁰ Income could not be used as a variable in the analysis due to lack of reliable income data in Anilao.

Table 6
Estimates of total potential annual revenues from entrance fees

	Conservative scenario (US\$)	Non-conservative scenario (US\$)
Anilao	94,988	116,368
Mactan Island	855,643	1,013,972
Alona Beach	3,540	5,310

US\$1 = P 25 was used as rate of exchange.

7. Policy implications

This pilot study found that on average diver tourists were willing to pay a positive amount to enter marine sanctuaries. This suggests that the institution of an entrance fee to cover maintenance and management costs of marine sanctuaries is a plausible option. Such an entrance fee would also allow local communities to capture the scarcity rent of coral reef resources. Moreover, by increasing the price of access to a pristine reef area (from travel costs only to travel cost plus entrance fee) the marine sanctuary management may achieve a decrease in the number of visitors and thus a reduction in the damage to the reefs [5,3].¹¹ Potential revenues to a sanctuary in each of the three pilot survey locations can be obtained by aggregating the average WTP to the estimated yearly number of visitors to each location. However, the reader should keep in mind the limitations of estimating aggregate benefits from a pretest.

7.1. Anilao

A previous study estimated that diver tourists accounted for about 64,600 visitor days on Mactan Island in 1994 [19]. This number of visitors is used as a conservative estimate of visitation, which is likely an underestimate given the increase in tourism to the general area. Assuming an annual growth rate of 7% in the diver population visiting Anilao, an estimate of 79,140, is obtained for 1997 to use as the non-conservative scenario. If the average WTP elicited in the survey in Anilao is instituted as the entrance fee (assuming that the WTP distribution of our sample represents the WTP distribution of the diver population visiting Anilao), 40% of the visitors would be expected to pay US\$4 to enter a marine sanctuary. Thus, the potential entrance fee revenues would be US\$95,000–116,000 (Table 6).

7.2. Mactan Island

No aggregate statistics exist on divers visiting Mactan Island. The only aggregate statistic available is that on the total number of non-resident tourists visiting Cebu. This number was 322,052 in 1995 [20]. As in the case of Anilao, we construct a conservative and a non-conservative scenario of dive tourist visitation. The

¹¹This depends on the elasticity of demand with respect to entrance fee.

conservative scenario assumes 322,052 as the number of visitors in 1997 and assumes that 50% of these visitors bought a ticket to enter the marine sanctuary off Mactan Island at least once during their vacation in this resort area. If the average sample WTP of US\$5.5 was the established entrance fee, the total potential revenues collected would be US\$855,643. The non-conservative scenario assumes that the number of visitors to Mactan Island increased by 7% per annum reaching 368,717 in 1997. Again assuming that half of these dive tourists visited the marine sanctuary and paid the entrance fee, the total amount of revenues collected would be nearly US\$1,014,000 (Table 6).

7.3. Alona Beach

No aggregate statistics were available on the number of divers visiting Alona Beach during a year. Interviews with three major dive shops in the area resulted in an estimated range of 2,000–3,000 divers per year. We took 2,000 as the conservative and 3,000 as the non-conservative scenario. Assuming that as in the sample, 59% of diver tourists are willing to pay a US\$4 entrance fee and visit the marine sanctuary at least once during their stay on Alona Beach, the conservative and non-conservative potential revenues would be between US\$3,540 and US\$5,310, respectively (Table 6).

8. Conclusions

This study explored the demand by local and international divers for dive trips to protected coral reef areas in the Philippines. Based on a pilot survey, results show a positive willingness to pay to enter marine sanctuaries where fishing, one of the major threats to coral reefs, is prohibited. Estimated annual potential revenues range from US\$0.85–1 million on Mactan Island, from US\$95–116 thousand in Anilao and from US\$3.5–5.3 thousand on Alona Beach. These revenues could be used to support coral reef conservation and possibly the creation of alternative employment opportunities for locals who would be barred from fishing, their traditional income generating activity. Another result of the survey is the finding that the vast majority of the tourists interviewed selected NGOs as the most credible organizations to collect and manage entrance fees. While the pilot survey is informative about the potential for raising conservation funds from dive tourists, the results are merely indicative of the range of feasible entry fees. For policy setting purposes, it would be desirable to replicate the study with larger samples in multiple dive destinations to more fully understand the determinants of demand for visits to marine protected areas and the feasibility of using entrance fees to achieve the dual goals of revenue generation and conservation.

References

- [1] Spurgeon JPG. The economic valuation of coral reefs. *Marine Pollution Bulletin* 1992;24(1):529–36.
- [2] Cesar H. Economic analysis of Indonesian coral reefs. Environment Department, World Bank, 1996.

- [3] White A, Barker V, Tangrigama G. Using integrated coastal management and economics to conserve coastal tourism resources in Sri Lanka. *Ambio* 1997;26(6):335–44.
- [4] Agardy MT. Accommodating ecotourism in multiple use planning of coastal and marine protected areas. *Ocean & Coastal Management* 1993;20:219–39.
- [5] Dixon JA, Scura LF, Van't Hof T. Meeting ecological and economic goals: marine parks in the Caribbean. *Ambio* 1993;22(2–3):117–25.
- [6] Sono Y. Philippine Dive masters' perceptions of the value of coral reefs, their awareness of roles in environmental education, Master's project, Duke University, Nicholas School of the Environment, Durham, NC, 1998.
- [7] Gomez ED, Alino PM, Yap HT, Licuanan WY. A review of the status of coral reefs of Philippine reefs. *Marine Pollution Bulletin* 1994;29(1–3):62–8.
- [8] Bureau of Fisheries and Aquatic Resources (BFAR). 1996 Philippine Profile. Department of Agriculture—Bureau of Fisheries and Aquatic Resources, Manila, the Philippines, 1997.
- [9] Gomez ED. Coral reef ecosystems and resources in the Philippines. *Conopy International* 1991;16(5):1–12.
- [10] Hoagland P, Kaoru Y, Broadus JM. A methodological review of net benefit evaluation for marine reserves, Environment Department Papers, No. 027, World Bank, Washington, DC, 1995.
- [11] Hodgson G, Dixon JA. Logging versus fisheries and tourism in Palawan. An Environmental, Economic Analysis, East-West Environment and Policy Institute, Occasional Paper No. 7, 1988.
- [12] Saunders L, Usher G, Weber J. Economic valuation of Bunaken National Marine Park resources: learning to manage the effects of people, unpublished manuscript, n.d.
- [13] Pendleton LH. Environmental quality and recreational demand in a Caribbean coral reef. *Coastal Management* 1994;22:399–404.
- [14] Hanemann WM. Valuing the Environment through Contingent Valuation. *Journal of Economic Perspectives* 1994;8(4):19–43.
- [15] Mitchell RC, Carson RT. Current issues in the design, administration, and analysis of contingent valuation surveys. In: Johansson PO, Kristrom B, Maeler K, editors. *Current issues in environmental economics*. Manchester: Manchester University Press, 1995.
- [16] Smith VK. Pricing What is priceless: a status report on non-market valuation of environmental resources. In: Folmer H, Tietenberg T, editors. *The international yearbook of environmental and resource economics 1997/1998*. Cheltenham, UK: Edward Elgar, 1997.
- [17] Reaves DW, Kramer RA, Holmes TP. Does question format matter? valuing an endangered species. *Environmental and Resource Economics* 1999;14:365–83.
- [18] Cameron TA, Huppert DD. OLS versus ML estimation of non-market resource values with payment card interval data. *Journal of Environmental Economics and Management* 1989;17:230–46.
- [19] Telesis. A socioeconomic framework for the proposed Haribon/URI project in Batangas Province, Philippines, Final Draft, August 8, 1994
- [20] Department of Tourism. Statistical Report, Manila, the Philippines, 1995.
- [21] Cesar H (ed.). *Collected essays on the economics of coral reefs*. Cordio. Kalmar: SIDA, 2000.