Opportunities and limitations of contingent valuation surveys to determine national park entrance fees: evidence from Costa Rica

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ABSTRACT. A contingent valuation method (CVM) survey to determine foreign and resident willingness to pay (WTP) for return visits to two different Costa Rican national parks was administered in 1995. WTP values were estimated for future entrance fees associated with proposed improvements to infrastructure and services in the Poas Volcano and the Manuel Antonio parks. Resulting logistic CVM models were statistically robust and mean WTP for entrance fees differed among the parks and were considerably higher than current fees. Results indicate that even in a developing country setting, the CVM is a useful tool to help determine park entrance fees in spite of the following methodological limitations which are recommended for further study: the need to include potential park visitors in survey samples; the lack of detailed information framing and contingent scenarios for park related WTP questions; and the threat of cultural-strategic biases when surveying residents of a developing country.

1. Introduction
In Costa Rica, and many other developing countries, national parks are important sources of direct and indirect revenues and necessary to protect biodiversity and national heritage (Morales and Cifuentes, 1989; Dixon and Sherman, 1990). The use of entrance frees for national parks and protected areas is justified in order to:

- generate revenues to recover costs and to ensure quality goods and services;

- reduce congestion in over-crowded parks while promoting visitation in less crowded parks through differentiated pricing;
- remove subsidized competition with privately owned protected areas;
- promote comparative equity by having direct users pay for parks and by foreign visitors paying relatively higher multi-tiered entrance fees than residents who themselves contribute to the establishment and maintenance of parks through general fund taxes or foregone opportunity costs (Harris and Driver, 1987; Leclerc, 1994; Laarman and Gregersen, 1996).

A review of the experiences of developing countries that have experimented with increased and multi-tiered entrance fees to national parks shows that demand among foreigners is less elastic, or less sensitive, than demand among residents and that in many cases increased user fees have reduced total visitation while increasing revenues (Lindberg, 1991).

Specific methodologies for determining entrance fees to national parks in developing countries have not been explicitly defined, although it has been suggested that they include some combination of: attempting to cover administrative costs; gradually increasing fees until excess demand is reduced; using surveys, marketing studies or more complex willingness to pay (WTP) estimates obtained from either the travel cost method (TCM) or the contingent valuation method (CVM) (Lindberg, 1991; Laarman and Gregersen 1996). It is also recommended that entrance fees changes be made in conjunction with the judgement and intuition of park managers, who can best evaluate extenuating local circumstances. In the case of Costa Rican parks, Bermudez (1997) has proposed that park entrance fees be flexibly determined by a set of variables that include: economic criteria including both visitor demand and revenue needs; bio-physical factors and carrying capacities of parks; and the socioeconomic and cultural conditions of local communities.

Entrance fees to the national parks in Costa Rica, which has long been the leader in ecotourism activities and development among the Central American countries, were until 1994 relatively low at $1 for foreigners and $0.65 for residents (based on the 1994 exchange rate). These fees are similar to national park fees in other Central American countries except for Honduras, which recently increased fees to a few of its most popular national parks to $10 for foreigners. However, during a 19-month period from August 1994 to March 1996, Costa Rica significantly and rapidly changed national park entrance fees for foreigners three separate times.

The first change in August 1994 increased entrance fees for foreigners from $2 to $15, while maintaining resident fees at 200 colones ($1.25 based on average 1994 exchange rates). This decreased foreign visitation by approximately 41 per cent (especially in the parks with medium to low visitation levels), increased revenues and created much public controversy and protest (SINAC, 1993–94; *Tico Times Newspaper*, 1994).

In July 1995, a reduced and differentiated system of park entrance fees was introduced where, with advanced purchase, fees for foreigners to parks with the highest visitation levels were lowered to $10, while fees for parks with medium and low visitation levels were lowered to $7 and $5

respectively. Non-advance purchase entrance fees were maintained at $15 for all parks and a special $29 pass valid for any five park visits was also introduced. These changes resulted in an increase in foreign park visitation by approximately 8 per cent while, at the same time, resident visitation increased by 21 per cent and there were decreases in collected revenues, administrative problems with the Park Services' ability to sell advance purchase tickets throughout the country and the concurrent establishment of a 'black market' in discounted entrance fee tickets, as well as the continuation of controversy and intensive public criticism of park fees (SINAC, 1993–94; *Tico Times Newspaper*, 1994).

Finally, in April 1996, park fees were reduced further to $6 for foreigners visiting any park in Costa Rica, while resident fees remained at $1. These relatively low and non-differentiated entrance fees resulted in: an increase in foreign park visitation by approximately 8 per cent; decreased revenues; increased visitation to many of the most popular and crowded parks, but decreased visitation to parks with medium and low visitation levels (SINAC, 1995–96). At least one in-depth study of the situation (Chase *et al.*, 1997), has determined that the current and non-differentiated entrance fee levels are not considered optimal in terms of revenue generation or in equalizing the distribution of visitation throughout the park system.

It is important to note that none of the recent changes in entrance fees to Costa Rica's national parks were based on objective economic analyses or on the willingness of either foreigners or residents to pay for entering different types of parks. In other words, the fee changes were based solely on *ad hoc*, experimental and political considerations that were difficult to explain and justify, which encouraged the heated public debate over entrance fees between ecotourism operators, park visitors and the government.

It is generally agreed by all interested parties that optimal national park entrance fees in Costa Rica should have the dual goals of revenue generation, in order to maintain and improve the infrastructure, services and protection of parks while not exceeding the WTP or consumer surplus of park visitors, and to encourage a more equally distributed pattern of visitation throughout the country's parks. However, what is not agreed is what specific methodologies should be used to determine optimal fees in advance of their implementation. The objective of this paper is to evaluate the effectiveness and suitability of the contingent valuation method (CVM) as a tool for establishing optimal and differentiated entrance fees for different national parks in Costa Rica and possibly in other developing countries. Following a brief review of CVM studies focusing on parks and protected areas in developing countries and in particular Costa Rica, a critical evaluation is made of a CVM study that determined the WTP of both foreigners and residents for future or repeat visits to two different Costa Rican national parks.

2. Parks and protected area CVM applications in developing countries

The contingent valuation method (CVM) uses a survey instrument to measure individuals' maximum willingness to pay (WTP) for different

natural resources or other public goods presented to them in a hypothetical market with a proposed or contingent improvement. In comparison with traditional attitudinal studies, the CVM has the advantage of providing a more accurate assessment of an individual's opinions, which, in addition, estimated WTP values can be incorporated into monetary based cost–benefit analyses (Cummings *et al.*, 1986).

CVM literature contains a wide spectrum of both applied and methodological case studies dealing with a huge variety of different public assets and natural resources (Mitchell and Carson, 1995). The majority of these CVM case studies have focused on developed countries, although in recent years many of the philosophical and practical issues associated with applying the CVM in developing countries have begun to appear. This development has included the evaluation of strategies to provide developing country respondents with sufficient time and information to make rational contingent valuations (Whittington *et al.*, 1990, 1992) and to permit non-monetary valuations of resources among traditional societies and cultures (Hardner, 1996; Shyamsundar and Kramer, 1996).

The application of the CVM to parks and protected areas is often somewhat problematic because many parks throughout the world already have existing entrance fees and hence a known market price. To remain consistent with CVM theory, it is necessary in such cases to propose hypothetical or contingent changes and improvements to the parks when eliciting WTP values from participants. As noted by Lindberg (1991), the following factors are likely to influence WTP for parks and protected areas and should be included in CVM studies: the desire to see, visit, and protect a particular park; trip quality and the fulfilment of expectations; income, age and educational levels; and the existence of substitute park and recreation sites.

In addition to the study reported in this paper, the CVM has been applied to the valuation of parks and protected areas in developing countries in at least nine other known cases which are summarized in Table 1. The majority of these park-related CVM applications have been made in Central America and in particular Costa Rica and only three of these (Abala, 1987; Echeverria *et al.*, 1995; Moran, 1994) have been published in referred journals. Also, most of these studies have focused only on foreign park visitors and have included a limited number of explanatory variables describing the socioeconomic characteristics of park visitors in their WTP models. Not surprisingly, most found that visitors' average WTP for park and protected area improvements, were higher than actual entrance fees charged. Finally, all of the studies focused on actual visitors to parks and protected areas rather than more general populations that include non-visiting but potential park visitors. This is acceptable if the objective of the study is to determine WTP values only for return visits to a park, but if the intention is to determine future WTP values of an entire population, then a biased sampling frame is being used.

In addition to the study discussed in this paper, three other CVM studies focusing on parks and protected areas in Costa Rica have also been conducted, two focusing on national parks and the third on a privately owned nature reserve. The first was actually a modified or pseudo CVM survey

Table 1. CVM Studies on parks and protected areas in developing countries

Study topic	Location	Authors and Year	Publication format
WTP for recreational services	Nairobi National Park	Abala (1987)	Eastern Africa Economic Review
WTP for hiking privileges & conservation	Annapurna, Nepal	Mishra (1988)	Case study: in book
User Fees at Protected Areas	Poas, Manuel Antonio, Cahuita	Baldares and Laarman (1991)	Case Study: Proceedings
Nature tourism development	Tikal, Guatemala	Barry (1992)	MS Thesis
WTP for park entrance fees	Bonaire Marine Park	Scura & van't Hof (1993)	World Bank Publication
WTP for park entrance fees	Various protected areas in Kenya	Moran (1994)	Biodiversity and Conservation
WTP for park entrance fees	Mantadia National Park	Kramer (1993)	Presented Paper
WTP for park entrance fees	Poas, Manuel Antonio, Irazu	Chase (1995)	MS Thesis
Valuation of a preserve	Monteverde Preserve	Echeverria, et al. (1995)	Ecological Economics

administered to 860 visitors to five of the most visited parks in Costa Rica in 1989 when non-differentiated entrance fees were only $0.30 (Baldares and Laarman, 1991). Foreign and resident park visitors were asked to select from ten pre-established entrance fee levels that they deemed appropriate. A traditional multivariate regression-based WTP model was not estimated, but instead average WTP values were correlated to a variety of socio-demographic variables and park characteristics. It was concluded that there was strong support for differentiated fees and that the resident and foreign park visitors WTP entrance fees were 100 and 400 per cent higher respectively, than the actual entrance fees.

A second study focused on the estimation of own- and cross-price elasticities among international visitors to three of the most popular Costa Rican national parks: Poas, Irazu and Manuel Antonio (Chase, 1995; Chase *et al.*, 1997). This involved the use of a modified contingent valuation survey (which the authors have termed a 'contingent behaviour methodology'), where respondents were asked if in the future they would visit different parks under a scenario of varying entrance fee prices. Therefore, mean WTP values for entrance fees were not estimated through a conventional CVM study design. However, it is interesting to note that by asking international park visitors the following questions:

1. In your opinion, what is a fair price for this park?
2. If the entrance fee for only this park were increased, what would be the daily per-person price for which you would decide not to visit this park?

that the authors estimated mean WTP values, based on sample sizes of approximately 105 surveys in each of the three parks, of $25 for Manuel Antonio, $21 for Poas and $22 for Irazu, all of which are considerably higher than fees actually charged at the time of the survey, and the fees currently being charged. In addition, the authors estimated WTP estimates, after correcting for starting point biases, to be on the average $34 for the parks.

The third CVM park-related study conducted in Costa Rica determined the mean WTP values for the prevention of agriculture conversion of the Monteverde Nature Preserve among 351 resident and foreign visitors (Echeverria *et al.*, 1995). Being focused on just one specific protected area, this dichotomous-choice CVM survey was able to convey a great deal of specific information and detail involving contingent scenarios for better protection of the preserve. The estimated mean one-time WTP values to help protect the Preserve were $137 for residents and $118 among foreigners. Income and education were the only socio-economic variables included in the CVM model and income significantly influenced WTP only among the foreign visitors, while education had a statistically significant relationship with WTP for both residents and foreigners. The most surprising result of this study was that Costa Rican visitors had WTP values 13 per cent higher than foreign visitors (a statistically significant difference), in spite of the fact that their incomes were about 345 per cent lower than those of the foreign visitors.

In spite of the existence of the three Costa Rican CVM parks studies de-

scribed above, the study that is the focus of this paper is considered relevant because it is the first Costa Rican park CVM study to estimate WTP values for both foreign and resident visitors to different national parks through the use of a conventional, dichotomous-choice CVM question format and the estimation of mean WTP values using a conventional non-linear multivariate model. The inclusion of both foreign and resident park visitors is important because CVM methods have not been proven to be unequivocally appropriate for widespread use with residents of developing countries, especially in the context of park- and recreation-related studies. Similarly, the use of dichotomous-choice bidding, where respondents simply reply yes or no to alternative WTP bid offers, has become the most widely accepted and used CVM bidding format because the decision format closely matches the way consumers make choices in the marketplace, because it minimizes hypothetical and strategic biases and because the resulting statistical models are consistent with utility maximization theory, which in turn facilitates the estimation of statistically robust WTP values (Hanneman, 1984; Cummings, *et al.*, 1986). In fact, dichotomous-choice bidding is a recommended methodological feature for CVM surveys made by the recent NOAA Blue Ribbon CVM Evaluation (Mitchell and Carson, 1995).

In summary, while other CVM and park-related studies have contributed important information relevant to the issue of park entrance fees in Costa Rica, they have not yet fully or definitively evaluated the effectiveness and suitability of the CVM to determine optimal and differentiated national park entrance fees in Costa Rica and other developing countries.

3. The present CVM study to determine WTP for different types of parks

Shortly after the $15 increase in Costa Rica's national park entrance fees in 1995, the present CVM study was conducted in order to estimate WTP values for future visits to two distinctly different Costa Rican national parks. The main objective was to evaluate the appropriateness of the CVM to determine both resident and foreign visitors WTP for future visits to different types of national parks, contingent upon their infrastructure and services being improved, and to determine the main factors influencing this WTP.

The Poas and Manuel Antonio parks were chosen as study sites as the two parks are notably different with regards to their physical characteristics, location, infrastructure and services and thus it was hoped to evaluate whether WTP estimates varied among different types of parks. Specifically the Poas Volcano, the most visited national park in Costa Rica, is within a one-hour drive of the capital, contains 5,600 hectares of unique tropical highland ecology and is renowned for its spectacular views of a volcanic crater, the central valley of the country and the Pacific ocean. The park also has the most modern and well equipped service facilities within the park system, including a visitor centre and museum. In contrast, Manuel Antonio, the third most visited park in Costa Rica, contains 682 hectares of jungle and 55 hectares of beach on the Pacific coast of the

country almost a four-hour journey from the capital. It contains a high concentration of flora and fauna and pristine beaches, but its infrastructure, services and facilities are limited.

Personal surveys were administered to a random selection of visitors to both the Poas and Manuel Antonio parks between March and May 1995 by a team of bilingual Costa Rican and other Latino enumerators. Personal surveys were used in order to explain fully parts of the survey to respondents and to verify results except in cases when respondents actually volunteered to answer the survey by themselves. A total of 424 usable surveys, split almost evenly between resident and foreign visitors in each of the two parks, were obtained. These surveys were intended to collect a variety of different information from park visitors describing their backgrounds, use and perception of each of the parks' goods and services and their WTP for improved goods and services in the parks. The specific WTP question included in the survey was:

> If the infrastructure and services in this park are greatly improved, would you be willing to pay $(BID) for the entrance fee in a future visit? (Yes/No).

BID is the entrance fee offered to the respondents, ranging from $1 to $50 for foreigners and from $0.5 to $29 (US) for residents. These BID ranges were anchored around the current entrance fees of the national parks at the time of the survey and, as in all CVM experiments, the BID was expected to have a negative and statistically significant relationship with WTP.

This WTP question was focused on proposed hypothetical improvements to infrastructure and services to be consistent with the contingent nature of the CVM, where it is assumed that people are only WTP more than the actual market price for a good if the increased fee is used to improve the characteristics and provision of the good (Cummings *et al.*, 1986; Mitchell and Carson, 1989). This is further justified by the fact that both resident and foreign visitors to Costa Rica's national parks feel that the quality of the park natural resource is extremely high while infrastructure and services should be improved (Unimer Poll, 1996; Wallace and Smith, 1997). The specific improvements to the infrastructure and services were not explicitly mentioned in the WTP question, so that the same question could be used in both parks to enable the evaluation of whether the CVM could elicit different WTP values for different parks, rather than just for different types of infrastructure and services. Another justification for keeping the WTP question free of specific infrastructure and service information was that the respondents had just visited the park and were therefore fully aware of the quality and quantity of the specific infrastructure and services within the park.

The predicted logit probabilities of a yes or no response were estimated with the following equation, based on a logistic non-linear maximum-likelihood estimation:

$$Z = b_0 + b_1 x_1 + b_2 x_2 + b_k x_k + u_i \tag{1}$$

where Z is equal to the log of the probability of a yes response divided by

Table 2. *Explanatory variables, Poas and Manuel Antonio CVM Models*

Variable	Definition	Hypothesis
BID	Amount of WTP/entrance fee (range)[a]	$B_{WTP}>0$
#PKS	# Other parks visited	$B_{\#PKS}>0$
#VIS	# Previous visits to this park	$B_{\#VIS}>0$
#GRP	# Persons together in travel group	$B_{\#GRP}>0$
TIME	Duration of park visit	$B_{TIME}>0$
INFO	Level of info./knowledge of park (high/low)	$B_{INFO}>0$
KNOW	Knowledge of fee debate (yes/no)	$B_{KNOW}>0$
SERV	Evaluation of park services (good/bad)	$B_{SERV}>0$
RESOUR	Evaluation of park resources (good/bad)	$B_{RESOUR}>0$
ORIG	Origin (North American, Europe, other)	$B_{ORIG}>0$
SEX	Male/female	$B_{SEX}>0$
AGE	Age in years	$B_{AGE}>0$
EDU	University education (yes/no)	$B_{EDU}>0$
INC	Income level ($)	$B_{INC}>0$

[a] Range of BIDS: $1–$50 (foreigners), ¢50–$28 (residents).

the probability of a no response, b_0 to b_k are the estimated coefficient parameters, x_1 is the amount of the entrance fee BID offered to respondents, and x_0 to x_k are the independent variables representing the socio-economic characteristics of the visitors and their perception and use of the specific resources and services of the particular park. Each of these explanatory variables is described in greater detail in Table 2, which also includes the expected sign and direction of each variable's expected relationship with WTP. Finally, u_i is the random disturbance term.

The predicted probabilities of respondents saying yes to the WTP question at alternative BID amounts were determined from equation (1) with the following equation:

$$P = 1/(1 + \text{exponential}^{-Z}) \tag{2}$$

where P is the probability of a yes response to the WTP question and Z is the logit prediction of a yes or no response.

For each of the two parks, separate models were estimated for foreign and resident visitors resulting in a total of four logistic regression equations. Following an approach put forward by Hanneman (1984), the estimated coefficients of each of these four models were used to estimate mean WTP values of the sample populations by mathematically integrating the area under each of the cumulative distribution curves representing the probability distribution of yes/no responses at alternative entrance fee BIDs.

The results of the study are summarized in Tables 3 and 4. Each of the four models has a significant chi-squared statistic at the 0.01 significance level indicating a significant relationship between the independent variables and the probability of yes responses to the WTP question. The BID variable was found to have a statistically significant and negative relationship with WTP in each model and the level of correct predictions for each model was between 73 and 83 per cent. This indicates that each of

Table 3. *Regression output: resident and foreigners—Poas Volcano Park*

Variable	Coefficient	Standard error	T-value	Mean
Model 3: Residents				
WTP	—	—	—	0.42
BID	−.0010721	0.0002091	−5.127*	2371
#PKS	0.0817064	0.1721412	0.475	2
#VIS	0.0693029	0.1268125	0.546	4.30
INFO	1.129354	1.012347	1.116	0.92
KNOW*	−1.290396	0.6650531	−1.940*	0.70
#GRP	0.0941015	0.1007465	0.934	5.50
TIME	0.2098598	0.2564036	0.818	3
SERV	−.04381094	0.6511066	−0.673	0.76
RESOUR	0.4561389	0.6024529	0.757	0.70
ORIG	0.5362905	0.7976069	0.672	0.84
SEX	−0.1910658	0.6254721	−0.305	0.71
AGE	−0.0118359	0.027801	−0.426	35.7
EDU	−0.5917269	0.6390651	−0.926	0.72
INC	4.34e−06	0.000012	0.362	80472
Constant	0.4348764	1.786502	0.243	—

n = 103 Chi squared$_{(14\ d.f.)}$: 52.66 (significant at the 99% level).

Correct predictions: No: 86% Yes: 76%; Total: 83%; Mean WTP: $11.

* Significant at 0.10 level or higher.

Model 4: Foreigners

WTP	—	—	—	0.49
BID	−.1282517	0.0274873	−4.666*	25
#PKS	0.1624098	0.2049868	0.792	2
#VIS	−0.0731687	0.2692851	−0.272	0.40
INFO	−0.5547401	0.695444	−0.798	0.60
KNOW	0.0395741	0.7021032	0.056	0.28
#GRP	−0.0058722	0.2042952	−0.029	3.10
TIME	−0.3732298	0.3264646	−1.143	2.60
SERV*	1.302545	0.6873915	1.895*	0.66
RESOUR*	2.461051	0.8782459	2.802*	0.69
ORIG*	1.267747	0.6571536	1.929*	0.48
SEX*	1.362479	0.692065	1.969*	0.70
AGE	−0.0079128	0.022775	−0.347	44.30
EDU	−0.2851808	0.774161	−0.368	0.80
INC	−5.78e−06	0.0000121	−0.476	49906
Constant	0.627669	1.723346	0.364	—

n = 103 Chi Squared$_{(15\ d.f.)}$: 63.68 (significant at the 99% level).

Correct predictions: No: 85% Yes: 81%; Total: 83%; Mean WTP: $23

* Significant at 0.10 level or higher.

the estimated WTP models is statistically robust and satisfactorily predicts the probabilities of visitors' WTP for future entrance fees to two different types of Costa Rican national parks.

However, the only explanatory variable that had a significant influence on residents' WTP values for Manuel Antonio was the value of the offered

Table 4. *Regression output: resident and foreigners—Manuel Antonio Park*

Variable	Coefficient	Standard error	T-value	Mean
Model 1: Residents				
WTP	—	—	—	0.49
BID*	−0.0007397	0.0001811	−4.084*	2332
#PKS	−0.1655566	0.1408166	−1.176	3
#VIS	−0.1112686	0.090539	−1.229	5
INFO	−1.421285	0.977697	−1.454	0.91
KNOW	−0.3686874	0.7162212	−0.515	0.81
#GRP	−0.111991	0.1286311	−0.871	3.70
TIME	−0.2678192	0.1966161	−1.362	4.20
SERV	0.0301442	0.5374916	0.053	0.52
RESOUR	0.7177217	0.6008867	1.194	0.70
ORIG	−0.3443239	0.5625358	−0.612	0.64
SEX	0.8767193	0.6875022	1.275	0.81
AGE	−0.0343126	0.0274931	−1.248	33.6
EDU	−0.0734024	0.6698753	−0.110	0.64
INC	4.58e−06	0.3839643	0.336	83835
Constant	5.66139	1.890553	2.995*	—

n = 106 Chi squared$_{(14 \text{ d.f.})}$: 34.91 (significant at the 99% level).
Correct predictions: No: 74% Yes: 72%; Total: 73%; Mean WTP: $13.
*Significant at 0.10 level or higher.

Variable	Coefficient	Standard error	T-value	Mean
Model 2: Foreigners				
WTP	—	—	—	0.39
BID*	−0.1516562	0.031016	−4.890*	25
#PKS	−0.2325632	0.1986434	−1.171	2
#VIS	−1.028667	0.7594829	−1.354	0.70
INFO	−0.0099885	0.6332284	−0.016	0.64
KNOW	−0.6165646	0.6300748	−0.979	0.50
#GRP	−0.1273918	0.274394	−0.464	2.5
TIME	0.0465173	0.2479911	0.188	4.70
SERV	0.2184589	0.6420009	0.340	0.30
RESOUR	−0.189701	0.6216554	−0.305	0.63
ORIG	−0.3009966	0.656737	−0.458	0.71
SEX	0.4137402	0.6257993	0.661	0.66
AGE	0.0284544	0.0296532	0.960	38.8
EDU	0.1354684	0.8186913	0.165	0.81
INC	9.50e−06	0.0000133	0.715	52798
Constant	0.3871132	1.843777	0.210	—

n = 103 Chi squared$_{(14 \text{ d.f.})}$: 58.55 (significant at the 99% level).
Correct predictions: No: 86% Yes: 69%; Total: 80%; Mean WTP: $14.
*Significant at 0.10 level or higher

entrance fee (BID), while for Poas both BID and knowledge of the recent park entrance fee debate in Costa Rica (KNOW) had a statistically significant and negative relationship with WTP. In the case of foreign respondents, the only explanatory variable that had a statistically significant influence on WTP for future visits to the Manuel Antonio was the

value of the entrance fee BID, while for the Poas, BID and the following variables had a statistically significant influence on WTP: visitors country of origin (ORIG), with North Americans having higher WTP values than other foreign visitors; the sex of visitors (SEX), with men having higher WTP values than women; and the satisfaction with the resources and services at the park (RESOURC and SERV), both of which had a positive relationship with WTP.

Based on previous CVM case studies and the literature, it is surprising and not fully understood why so few of the explanatory variables of these models, especially visitation patterns, satisfaction indices and income and education, did not have statistically significant relationships with WTP. It is suspected that this may be the result of one or more of the following factors: the need to sample a wider or more general population of both actual and potential park visitors; the sample size was too small especially with respect to the use of logistic, dichotomous-choice WTP models; and, finally, that respondents did not truthfully respond to the WTP questions. Sample size issue can be easily increased for future CVM survey efforts, while solutions to the remaining, more problematic, issues will be discussed further in the final conclusions and discussion section of the paper.

Among residents, mean WTP values for future visits were $11 to a hypothetically improved Poas volcano national park and $13 for Manuel Antonio. These WTP values are nearly 900 per cent higher than the actual entrance fees charged to Costa Rican residents to enter each of these parks, which indicates that if the infrastructure and services of these parks were greatly improved, entrance fees for resident visitors could likely be increased in order to increase collected revenues. WTP values for improved goods and services among residents were slightly higher for Manuel Antonio than Poas, which was expected as visits to Manuel Antonio are more time consuming and expensive than visits to Poas. Furthermore, the pristine beach conditions and high density of wild animals within the Manuel Antonio park are probably more of a premium to Costa Rican visitors, the majority of whom live in the Central Valley in close proximity to several other volcanoes and scenic views.

Among foreign visitors, mean WTP values for future visits to a hypothetically improved Poas volcano national park were $23, or 50 per cent higher than the fee at the time of the survey and 280 per cent higher than the current fee. For Manuel Antonio, the mean WTP estimate was $14, which is close to the actual fee charged at the time of the survey but 150 per cent higher than the current fee of $6. It would therefore appear that foreign visitors are being undercharged for visits to two of Costa Rica's most popular national parks. It is also interesting to note that, in contrast with resident visitors, foreigner's mean WTP values are higher for Poas than Manuel Antonio, probably because there are many beaches in the USA and Europe but very few semi-active volcanos.

4. Conclusions and discussion

4.1 Advantages and opportunities of CVM for determining park entrance fees
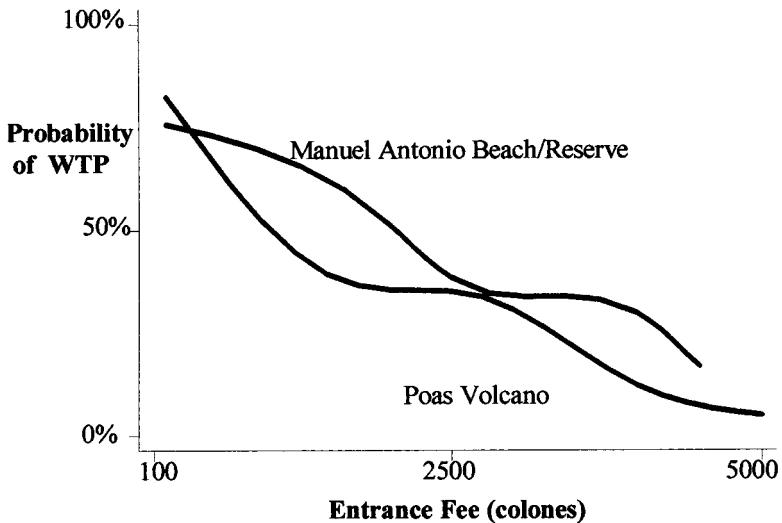The results of the CVM study presented in this paper indicate that there

Figure 1. *Residents' WTP: Manuel Antonio and Poas Parks.*

are several specific opportunities and advantages associated with the use of the CVM for determining optimal and differentiated entrance fees to national parks in Costa Rica and possibly in other developing countries. The most important are the ability to estimate statistically robust models representing WTP for park entrance fees among both residents and foreigners and the possibility of estimating alternative WTP values for different types of national parks.

This ability to estimate statistically robust WTP models for park entrance fees among both residents and foreigners was established as being possible using a conventional dichotomous-choice, logistic WTP model which is a potentially important tool for park planners and administrators to use in determining optimal entrance fees with respect to revenue generation. For example, it was shown in this study that WTP values for future visits to two Costa Rican parks are considerably higher than the current $6 fee, meaning that fees could likely be increased without sharp reductions in visitation which would result in an increase in the collection of fee revenues. A particular advantage of using a dichotomous-choice logistic-based model to estimate WTP values is that by using equation (2) it is possible to evaluate the probability of respondents being WTP for future park visits at alternative entrance fee levels. Figures 1 and 2 illustrate such relationships for each of the four WTP models estimated in this present study. Specifically, they illustrate the probability of both resident and foreign visitors being willing to enter the Poas and Manuel Antonio Parks in the future at alternative entrance fees, contingent on the improvement of the infrastructure and services of these parks.

The second important opportunity for using the CVM to value park entrance fees is with regard to its ability to determine differential park
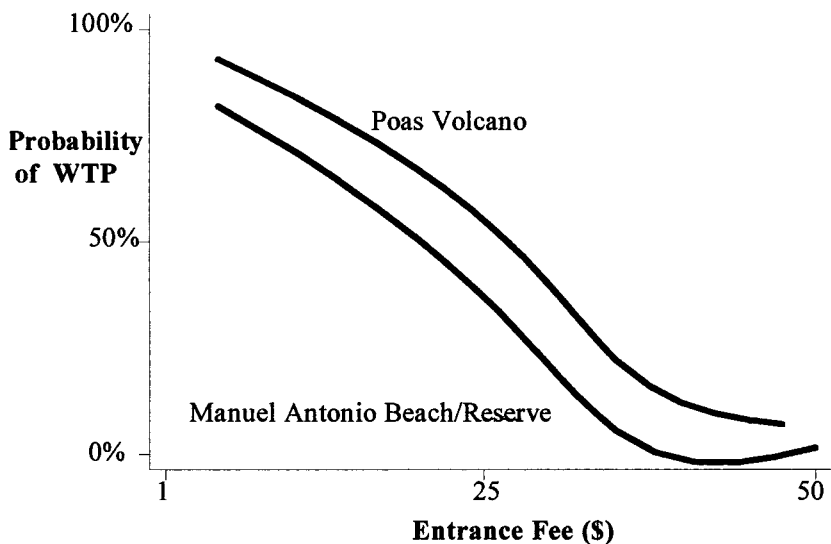
Figure 2. *Foreigners' WTP: Manuel Antonio and Poas Parks.*

entrance fees, which can be used to establish alternative entrance fees for different parks that match the actual WTP levels and hence demand for individual parks. It is expected that such differentiated fees would decrease visitation in the most crowed and expensive parks while increasing visitation in the more sparsely visited, yet cheaper, parks. However, this and the other Costa Rican park-related CVM studies focused only on highly visited national parks in order to facilitate the rapid collection of surveys. Therefore, it is recommended that in order to investigate fully the usefulness of the CVM in determining differential entrance fees to Costa Rica's national parks, future studies should also include parks with medium to low visitation.

Limitations of the CVM for determining park entrance fees
Several potential limitations associated with park-related CVM studies in a developing-country setting were also noted by this study including: the need to include potential park visitors in CVM survey samples; the need to provide more detailed information framing within contingent scenarios for park-related WTP questions; and the threat of cultural-strategic biases when using personal surveys with developing-country residents.

The need to include potential park visitors in CVM survey sample design is related to the fact that our study and all the other known park-related CVM studies only surveyed actual visitors to parks through on-site surveys. The resulting sample therefore captures only potential repeat visitors, while excluding the population of potential visitors (either residents or foreigners) who have not visited the park because they con-

sidered the entrance fee too expensive, or for some other reason.[1] Therefore, the resulting mean WTP estimates are probably artificially high compared to the expected WTP levels of the entire population of potential park visitors, including non-visitors. Also, it is very likely that the separate populations of actual and potential park visitors may have very homogenous and distinct socio-demographic patterns and characteristics, and that this may be partially responsible for the lack of statistical significance of many of the explanatory variables of the WTP models of this and other studies.

The solution to this problem is simply to sample the full population of both actual and potential visitors to national parks, which is not commonly done because of time and funding constraints. In other words, it is much easier and cheaper to simply conduct on-site park-exit surveys than it is to sample and survey a more general population of potential park visitors. In the case of foreign visitors, a possible solution would be to conduct exit surveys at the international airport in addition to on-site park surveys, as was done in a CVM study of protected areas in Kenya (Moran, 1994). However, the task of sampling a complete population of potential resident park visitors is much more problematic because in Costa Rica and many other developing countries a large percentage of the population do not have telephones or mailing addresses, making face-to-face stratified home personal surveys in the major cities of the country a time-consuming and expensive solution. However, a useful alternative strategy would be randomly surveying residents visiting a variety of different (including free and low-cost) recreation sites throughout the country. It is therefore proposed that future park-related CVM studies in developing countries sample more complete and representative populations of both resident and foreign potential park visitors and that resulting WTP estimates be compared among different populations based on their physical location and/or recreation patterns

The second limitation of using the CVM for park-related studies is associated with the lack of detailed information framing within the contingent scenario component of WTP questions. This was noted in our study and all the other reviewed park-related CVM studies, except for the study that was focused only on the individual Monteverde Preserve (Echevarria *et al.*, 1995). Again, the justification for keeping the focus of the WTP question simple and standard for the WTP valuation of the two parks in our study was to allow for a comparison of WTP values between two different parks. And, in fact, while the information framing in this WTP question is obviously limited, it actually contains more detailed information framing than many of the other park- and protected-area CVM surveys summarized earlier, again with the exception of the Monteverde Preserve study. However, it is suspected that this lack of information fram-

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[1] This phenomenon became apparent to the survey enumerators, who noticed that many Costa Rican visitors to the Poas and Manuel Antonio parks travelled to the parks in luxury cars while many groups of poorer families were often noted to be picnicking and relaxing just outside the park boundaries in an obvious attempt to avoid paying the entrance fee.

ing specificity has contributed to the lack of statistically significant explanatory variables in our WTP models and in those of the other park-related CVM studies. It is therefore recommended that future CVM studies focus on how different contingent information-framing scenarios, especially those describing different types of improvements to park services and infrastructure, affect the WTP estimates associated with entrance fees to parks and protected areas in developing countries.

Finally, the threat of cultural-strategic biases associated with using personal surveys to elicit WTP values from developing country residents was noted to be a potential limitation with the use of CVM surveys for valuing park entrance fees. Specifically, our results showed that WTP values for park entrance fees among residents ($11 and $13) are approximately 900 per cent higher than the actual entrance fees, while foreigners WTP values were on average only 250 per cent higher than their actual entrance fees. This is surprising as foreigner's income levels, as well as their total costs of visiting these parks, are considerably higher than those of residents. Similarly disproportional WTP values among foreign and Costa Rican resident visitors were also noted in the CVM survey for the Monteverde Preserve, where residents had WTP values 13% higher than foreign visitors in spite of having considerably lower income levels. The authors of this study (Echeverria *et al.*, 1995) have suggested that this difference in WTP values between residents and foreigners may be a result of the fact that Costa Ricans have a great deal of pride in their parks and natural resources, together with the fact that they are more likely to be repeat visitors than are foreigners.

However, we suspect that the reason why Costa Rican residents have higher WTP values relative to their income levels than do foreigner visitors is the result of a cultural-strategic bias related to their unfamiliarity with personal surveys and providing truthful negative responses to interviewers. More specifically, in the United States and other developed countries where CVM surveying was pioneered, most respondents are familiar with receiving a wide range of personal, mail and telephone surveys dealing with a wide variety of subjects. It is therefore our hypothesis that these foreign respondents are less likely to feel embarrassed about answering a WTP question negatively than are Costa Ricans and possibly people from other cultures who are not accustomed and/or familiar with face-to-face personal surveys and specifically with their intended non-personal, truth-seeking and anonymous nature.

This hypothesis is further supported by two additional factors. First, the enumerators of our study qualitatively observed that, in general, foreigners asked to participate in the survey treated the event very informally and quickly went about reading and answering the survey and afterwards many of these foreigners openly expressed their opinions regarding the park and a variety of other related environmental issues. In contrast, Costa Rican visitors asked to participate in the survey were generally apprehensive and often initiated an extended dialogue before beginning the survey. And, in almost all cases, they preferred to have the surveyor read and answer questions for them, and they asked a lot more questions throughout the survey process than did foreign respondents. Finally, resident visitors

were almost always positive, rarely ever making critical or negative remarks to the surveyors regarding Costa Rica or its national parks system, and rarely refused to participate in the survey, in contrast to an approximately 3 per cent rejection rate among foreign visitors. The second indication that resident visitors may have been making unrealistic and artificially positive WTP responses is that, in spite of having mean WTP values considerably higher than the actual fee, when the resident entrance fee prices increased in 1994 (from $0.65 to $1), a 21 per cent decline in resident park visitation was noted (SINAC, 1994–95 statistics).

Unfortunately our suspicions concerning cultural-strategic biases of CVM surveys are not further supported by quantified, statistically significant and conclusive data. The existence of strategic biases in CVM surveys in developing countries has been tested for *a priori* in only one known case, in Haiti where two groups of respondents were provided with different WTP scenarios, each with a distinctly different likelihood of respondents actually having to pay. In this particular case, strategic bias was not found to be statistically significant (Whittington *et al.*, 1990). It is therefore strongly recommended that similar and other methodological tests to detect possible cultural-strategic biases be applied to other CVM case studies and, in particular, to CVM studies associated with parks and protected areas in developing countries. For example, WTP values could be compared among different groups of residents given the same WTP question administered with alternative levels of interaction and confidentiality between respondents and enumerators. This, however, would require methods to account for the effects of giving respondents more time to respond to the WTP question, as Whittington *et al.* (1992) found that increased response time decreased WTP valuations for water in Nigeria.

In summary, this paper has demonstrated that the CVM can be successfully used to help determine entrance fees to national parks in Costa Rica that are optimal in terms of revenue-generating potential and visitors' WTP levels and differentiated to account for variations in demand for different parks. It is also felt that such CVM applications are appropriate for determining optimal and differentiated national park entrance fees in other developing countries of the world. However, several methodological problems and limitations associated with park-related CVM studies were noted including: the need to sample complete populations of potential park visitors; the need for more detailed information framing and contingent scenarios in park-related WTP questions; and the threat of cultural-strategic biases from the use of personal surveys with residents of developing countries. It is hoped that all of these potential limitations will be further investigated and hopefully resolved through additional methodological and applied CVM case studies and research in the future in Costa Rica and in other developing countries of the world.

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