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Price Responsiveness in the Developing Country Nature Tourism Context: Review and Costa Rican Case Study

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Research on user fees recently has increased in the US in response to legislative changes expanding imposition of such fees. Parallel developments have occurred in developing countries, though much of the research has focused on valuation rather than price responsiveness per se. This article reviews estimates of willingness-to-pay, revenue maximizing fees, and price elasticities in developing countries. It then uses actual price and visitation data to estimate price elasticities for three national parks in Costa Rica. Based on a $1 increase from a $5 fee, estimated elasticities for Poás, Irazú, and Manuel Antonio are, respectively, −0.051, −0.296, and −0.238. These estimates are substantially different from those based on a recent stated preference study at the same parks.

KEYWORDS: *Fees, price elasticity, developing countries*

Introduction

Although fees have been charged for access to US federal lands since Mount Rainier National Park imposed a visitor fee in 1908 (MacIntosh, 1984), recent legislative changes have expanded imposition of such fees, and there has been a concomitant research interest in the issue. However, the US is not alone in considering and implementing visitor fees. Many countries face similar, and often more extreme, pressures to charge visitor fees, and anecdotal evidence suggests that fees outside the US may be both more common and, in some countries, higher than in the US. Nonetheless, evaluations of international experience are uncommon in the recreation literature.

This article reports on this international experience, particularly that of developing countries; much of the material on this experience is found in the tourism and resource management literatures, and interested readers also are referred to these literatures for discussions of developed country experience outside the US (e.g., Van Sickle and Eagles, 1998). The present article begins with a discussion of similarities and differences in the pricing context and then focuses on a central issue in the field: How price responsive is visitation? Results from previous stated and revealed preference studies are

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presented, followed by results from econometric evaluation of actual price responsiveness using three Costa Rica national parks as case studies. The focus is on international visitation, as much of the attention with respect to fees for access to public lands in developing countries has been on fees for foreigners rather than for nationals. This implies a focus on tourism rather than recreation, but semantically the two are grouped together under the terms "visitor" and "visitation."

Similarities and Differences in Context

There are substantial variations with respect to legislative, policy, and cultural orientations across developing countries, as well as between developing countries and developed countries. The focus of this article is on differences in the resource management and recreation/tourism context between the US and many developing countries, with specific attention to how economic issues affect that context and, especially, how that context affects the economics of fees, particularly visitor responses to such fees. Laarman and Gregersen (1996) and Lindberg (1998) provide further discussion of pricing issues in the context of visitation at developing country natural areas.

Though the US is one of the world's richest countries, as measured by per capita gross domestic product (GDP), and has experienced a sustained period of economic growth, federal budget allocations have not been adequate to meet stated agency funding needs for providing recreation services on public lands. This lack of public funding is a driving force behind implementation of recreation fees. Similar, and more extreme, forces operate in most developing countries. For example, the 1995 US per capita GDP, at $26,980, was ten times that of Costa Rica, 96 times that of Kenya, and 135 times that of Nepal (World Bank, 1997) (unless otherwise noted, all monetary units are US dollars). This leads to commensurably greater pressures on public funding in developing countries. In addition, the US has a long history of governmental funding for management of public lands, while the establishment and funding of public lands such as national parks generally is a much more recent phenomenon in developing countries. Therefore, it is not surprising that the financial pressure to implement visitor fees is significant in many developing countries.

There is no international database that provides comprehensive information regarding use of fees, but anecdotal evidence indicates that they have been introduced and/or increased at many developing country natural areas during recent years. Responses to a survey of protected areas conducted in the early 1990s suggest that about one-half of the world's protected areas charge entrance fees (Giongo, Bosco-Nizeye, & Wallace, 1994). It is likely that this proportion has increased since the survey was conducted.

The equity impact of fee policy has long been an important consideration in the US context (e.g., Harris & Driver, 1987), and similar concerns typically exist for domestic visitation in the developing country context. However, such concerns are less relevant in the case of international visitation,

particularly when the visitors tend to be much wealthier than residents of the destination country. Framed in economic terms, it may be difficult to justify retaining low or nonexistent fees in order to maximize the consumer surplus of foreign visitors. Many countries, including Costa Rica, have implemented multi-tiered fee systems in order to limit equity impacts for nationals while generating revenue from foreigners. However, several other countries have retained uniform fee systems, in some cases due to explicit or perceived legislative prohibitions on differential fees.

Another consideration is that fees may change the nature of the visitor experience by making it more structured and commercialized (Lindberg, 1998). Similarly, fees may increase visitor expectations to be "entertained," which may diverge from management agency efforts to use visits as opportunities for interpretation and education. However, in the developing country context, the experience already is relatively structured and commercialized—it often is part of a trip that has long been planned, has cost substantial money to undertake, and has involved various business intermediaries.

Conversely, the involvement of tourism business intermediaries may exert pressure in opposition to fees for two reasons. First, the tourism industry may oppose fees for fear that fees will reduce visitation, and thus their customer base (in some cases, opposition may also result from industry concerns that fee systems will enable the government to more closely track the number of clients, and thus business income). This opposition can be quite strong and may occur even when contemplated fees are unlikely to noticeably affect visitation levels. For example, Lee and Snepenger (1992) report that tour operators at Tortuguero National Park in Costa Rica considered a boycott of the park to protest an increase in fees from $0.28 to $1.11.

Second, economic development needs, as exemplified by the GDP figures presented above, often result in national and local community desires to maximize employment opportunities within the tourism industry. Creation and maintenance of such opportunities can contribute not only to economic development, but also to conservation of the natural areas that often serve both as tourism attractions and as sources of resources (e.g., food and fiber) for local communities (WRI/IUCN/UNEP, 1992; Lindberg, Enriquez, & Sproule, 1996). There has been some attention to natural area recreation and tourism as a generator of employment in the US, particularly in regions with declining natural resource-based industries (Keith, Fawson, & Chang, 1996). However, this issue appears to receive even greater attention in developing countries, and it exerts downward pressure on fee levels in order to maintain or increase visitation levels. For example, the Costa Rican National Chamber of Tourism (CANATUR) estimated that the fee increases described below led to a national income loss of $65 million in the mid-1990s due to fee-induced visitation declines (Inman et al., 1998). The analyses that have been conducted typically indicate that demand is price inelastic, such that the tradeoff between fee levels and visitation levels (and thus business opportunities) may not be as great as is often believed. Moreover, the implementation of revenue-sharing programs in countries like Nepal,

Zimbabwe, and Kenya mean that high fees can also benefit local communities (Brandon, 1996; Lindberg, 1998). Nonetheless, the interests of tourism businesses and the employees they hire often hinder implementation of fees or fee increases.

The above has focused on how the context of international visitation in developing countries affects the likelihood of fee implementation. The following focuses on how this context is expected to affect the reactions of visitors to such fees. Loomis (1995) models four steps in the recreation choice process: 1) whether to participate in an activity, 2) which site to visit if one chooses to participate, 3) how many trips to take to the site, and 4) how long to stay at the site (c.f., Loomis & Walsh, 1997; Siderelis & Moore, 1998). Though systematic analysis of the choice process of international visitors to natural areas in developing countries has not appeared in the literature, anecdotal evidence suggests that this process differs from that in the domestic recreation process. For example, the steps may be 1) whether to take a trip, 2) what type of trip to take (e.g., nature oriented, beach oriented, or some combination of these or other orientations), 3) to what destination (one or more regions, countries, and sites), and 4) how long to stay. Step 3 in the international context can be expanded into substeps whose order may vary. For example, in some cases the region will be most important, and countries and sites will be selected secondarily. In other cases, a site will be most important, and the country and region will naturally follow.

In general, the choice process in the international tourism context will be more complex than in the domestic recreation context. Moreover, the choices of other actors, and particularly of tour operators, typically will play a greater role in the former. To some degree, operators probably behave like individual visitors. For instance, they may be unlikely to shift away from unique sites in the face of a price rise. However, the decision making process of operators may diverge from that of visitors, in part due to greater information about substitutes. For example, in response to a contingent valuation survey a visitor may report a willingness to pay an additional $20 in tour costs to visit the site in question. However, if the tour operator believes that a different site is a good substitute and will not be raising fees, the operator may shift the tours to that site (the issue of information regarding substitutes is also discussed below).

Though the role of operators in visitation decisions may increase elasticity, the related issue of visitor perceptions of a site visit as part of a larger package suggests that this elasticity may be low (unless otherwise stated, all references to elasticity are to own-price elasticity). It is likely that many tourists view a site visit, and any associated fee, as part of a larger trip package, even when this is not strictly the case; that is, the natural area visit is viewed as one of many inputs forming the tour product. This assumption will be met in the common case in which the visit is part of a packaged tour or when the fee is "hidden" in the price of larger purchases like airline tickets. Moreover, framing effects in consumer behavior may lead non-tour visitors to perceive the fee in this manner (Kahneman & Tversky, 1982:168; Tversky & Kahneman, 1986).

Once this assumption is made, the principles of derived demand suggest that quantity demanded will be relatively unaffected by increases in user fees (Nicholson, 1992:662-663). This is illustrated by the following example of visits to natural areas in Belize, Central America (following Lindberg, Enriquez, & Sproule, 1996). First, the smaller the share of total product cost, the less elastic the derived demand for the input. In the case of Belize, a fee of $1.50 is much less than 1% of the $1,006 estimated average tourist expenditure per visit in Belize (Central Bank Research Department, 1992).

Second, the less elastic the demand for the product, the less elastic the demand for inputs. Demand for nature tourism trips, such as those to Belize, is thought to be less elastic than for traditional tourism trips, such as to Caribbean "sun and sand" destinations. This is because there tend to be fewer substitutes for the types of attractions found in Belize than for the sun and sand sites. As a result, fee increases for inputs to the Belize tour product, such as a natural area visit, would have less effect on quantity demanded than would fee increases for inputs to a generic sun and sand tour product.

These first two principles are based on the concept that a fee increase will increase tour price by only a small percentage and that this increase in tour price will in turn only lead to a modest reduction in quantity of tours demanded. Therefore, natural area fee increases will have little impact on the number of tourists in the country. The impact at the site level will depend on the qualities of the site. The third principle is that the lower the elasticity of substitution across inputs, the lower the elasticity of demand for particular inputs. Thus, the effect of fee increases at a specific site within a tour package, such as at a particular natural area within Belize, will depend on how unique that site is relative to other sites that serve as potential inputs to the package. Unique sites will be able to sustain higher fees with less effect on visitation than will less unusual sites.

This discussion of derived demand is based on the assumption that tourists are faced with the fee, either directly or via its effect on a tour package price, when making choices to visit sites. However, in some cases, tourists may learn of the fee only after a commitment has been made to visit the site, such as upon arrival at the entrance. For example, Chase (1995) found in a survey of visitors at three Costa Rican national parks that almost three-quarters of foreign tourists did not know what the entry fee would be in advance of arriving at the park (c.f., Lawson, Gnoth, and Paulin, 1995). Typically, a substantial time and monetary commitment has been made to visit the site, and this commitment may lead to a willingness to pay the fee rather than cancel the visit. Because repeat visitation is less likely in international tourism than in domestic recreation, knowledge of the fee gained upon arrival may have little effect on future visitation.

These factors suggest that foreign demand for visitation at developing country natural areas typically will be inelastic, particularly at fee levels (e.g., $10 or less) that are low relative to overall trip price and when there are few good substitutes. Therefore, the first hypothesis to be tested is that visitation at developing country parks will be inelastic (i.e., elasticity will be less, in absolute value, than 1.0). The second hypothesis is that different parks will

exhibit different elasticities, depending on their uniqueness, and thus their attributes. The next section reviews previous research findings, with a primary focus on the first hypothesis (given the dearth of literature on the second); the following section presents results from an econometric analysis of prices and visitation at Costa Rican national parks.

Review of Previous Research

Because most sites do not price in a market situation, various nonmarket valuation methods have been used to estimate demand curves or, more commonly, net willingness to pay (WTP) for natural area visits; net WTP is used synonymously with consumer surplus. Though net WTP is not a measure of elasticity, relatively high values for mean net WTP can, depending on functional form, lead to relative inelasticity. The most popular methods have been the travel cost method (TCM) and the contingent valuation method (CVM). TCM uses expenditures on various trip costs, such as transportation, to infer the value visitors place on the destination visit itself. CVM uses visitor responses to hypothetical fee scenarios to infer the value they place on their visit (see Loomis & Walsh, 1997 for further discussion of these methods).

Very few elasticity estimates have been published for developing country nature tourism. Navrud and Mungatana (1994) estimated price elasticities of −0.17 to −0.84 for foreigners and −1.77 to −2.99 for residents for wildlife viewing at Lake Nakuru National Park, Kenya. Chase et al. (1998) used contingent behavior to estimate own- and cross-price elasticities for international tourism at three national parks in Costa Rica. Own-price elasticities were −2.87 for Volcán Poás, −1.05 for Volcán Irazú, and −0.96 for Manuel Antonio.

Barnes (1998) used CVM with payment card to estimate net WTP, demand functions, and elasticities for wildlife-oriented trips to Botswana. Average net WTP for the Botswana trip portion was 639 pula (US $300 at the time of the study (1992)), which represented 21% of trip expenses (this proportion of average net WTP relative to average trip cost is similar to other work by the same author in Namibia). He estimated several demand functions and elasticities, with a mean elasticity of −0.68 for campsite users, −1.35 for lodge users, and −0.93 for the two combined. However, he notes that these might be overestimates due to potential specification bias. Barnes also reports that visitation at Moremi Game Reserve did not decrease (in fact, it increased) in response to significant national park and game reserve fee increases instituted in 1989.

Edwards (1987) used an hedonic price model to estimate a revenue-maximizing price of $173.50 per visitor-day for the Galápagos Islands in Ecuador. This price would generate approximately $12 million in site revenues, but it would reduce tourism industry revenue by about $25 million. Table 1 presents other estimates of WTP and revenue-maximizing fees; there have also been several "pseudo-CVM" studies that focus on fees considered "fair" or "appropriate," but results from these studies are not reported here.

TABLE 1
Net Willingness-to-Pay Estimates For Foreign Visits to Developing Country Natural Areas

Site/resource	Method	Mean WTP ($)	Sources and notes
Kenya	CVM (DC)	72/day	Moran (1994); several sites (not just park visitors); payment in increased tour cost.
Tarangire, Tanzania	CVM (PC)	36-49/day	Clark, Davenport, and Mkanga (1995).
Kenya	TCM	78-134/day	Brown, Swanson, and Ward (1994). Revenue-maximizing fee = $84/day.
Kenya	CVM (OE/DC)	72-86/day	Brown, Swanson, and Ward (1994). Revenue-maximizing fee = $90-$330/day (TCM).
Lake Nakuru, Kenya	TCM	114-120/visit	Navrud and Mungatana (1994).
Lake Nakuru, Kenya	CVM	73/visit	Navrud and Mungatana (1994).
Beza, Madagascar	TCM	265-349/visit	Maille and Mendelsohn (1993).
Mantadia, Madagascar	CVM (DC)	61	Mercer, Kramer, and Sharma (1995). WTP for adding site to trip itinerary.
Botswana	CVM (PC)	300	Barnes (1998). WTP for Botswana portion of trip.
Monteverde, Costa Rica	TCM	1,150/visit	Menkhaus and Lober (1996).
Poás, Costa Rica	CVM (DC)	23	Schultz, Pinazzo, and Cifuentes (1998). WTP entrance fee for future visit to park with improved infrastructure/services.
Manuel Antonio, CR	CVM (DC)	14	Schultz, Pinazzo, and Cifuentes (1998). as above.

Notes: DC = dichotomous choice, PC = payment card, OE = open-ended, WTP ranges based on differences in functional form or other factors. Some TCM studies (e.g., Maille and Mendelsohn; Menkhaus and Lober) focused on specific sites, but estimates were generalized to the country as a whole due to the multiple destination problem in TCM.

A minority of these estimates indicate elastic demand, but overall they are similar to those found for recreation in the US and other developed countries insofar as they reflect price inelasticity. Loomis and Walsh (1997: 120, based on Adams, Lewis, & Drake, 1973) present various US elasticities for activities (rather than sites), with the most elastic value being −0.40 for sailing day outings. However, they note that demand for individual sites, rather than activities, will tend to be more elastic, as several sites may be able to provide the same activity opportunity. The USDI and USDA (1999:1) note that "visitation by the public to the vast majority of fee demonstration sites does not appear to have been negatively affected by increased or new fees."

Knapman and Stoeckl (1995) used TCM to estimate demand curves for Kakadu National Park and Hinchinbrook Island National Park in Australia. Based on their models without allowance for the opportunity cost of travel time (Models A and C), and using an entrance fee increase from AU$5 (price at time of survey) to AU$6 for Kakadu, they estimated an elasticity of −0.014; demand was not estimated to become elastic until a fee of AU$197 (AU$1.00 ≅ US$0.65). Using an entrance fee increase from AU$0 (price at time of survey) to AU$1 for Hinchinbrook, they estimated an elasticity of −0.0015; demand was not estimated to become elastic until a fee of AU$166. They note that Australian empirical studies typically generate elasticity estimates of −0.033 to −0.40.

Though these studies provide mixed support for the first hypothesis (that demand is inelastic), several considerations suggest that results should be treated with caution. First, many TCM and CVM applications in developing countries have not followed "best practice" survey research methods. Common problems include noncoverage and nonrandom samples. Seasonal differences in visitor types and origin countries may be a particular concern in this regard; the discrepancy between the population and sampling frame likely introduces substantial coverage error. In addition, small sample size often is an issue, as it may lead to large sampling error. For example, the Maille and Mendelsohn (1993) study had a sample of 79, of which only 52 supplied full information.

Moreover, though some causes of survey nonresponse may be unassociated with WTP, nonresponse error may occur insofar as nonresponse may be more likely to occur amongst those less interested in the good being valued, in this case a park visit (Mitchell & Carson, 1989:269). As a result, nonresponse may lead to an overstatement of WTP and an understatement of price-responsiveness. For example, Moran (1994) notes a high refusal rate resulting from a screening process in which potential respondents were informed of survey completion time. For both TCM and CVM, models often do not incorporate substitutes, and this may significantly underestimate price responsiveness.

In addition, both CVM and the TCM can be subject to violations of the various assumptions on which they rest. For example, CVM assumes that respondents will respond to the hypothetical scenario in a manner consistent with their actual behavior. TCM assumes that visitors will respond to fees in

the same manner as to other travel costs. These, and other, assumptions may be untenable in the international tourism context. For example, due to past experience regarding what is "normal" or "reasonable," visitors may react quite differently to an entrance fee increase of $50 than to an international airfare increase of $50. Lastly, site surveys typically are conducted ex post, at the end of the visit, while site choice decisions are made ex ante. In the case of CVM, a visitor may respond differently depending on whether he or she is presented with the scenario before or after the visit.

For these reasons, though CVM and TCM provide useful "first approximations" to actual behavior, it is best to estimate demand curves and elasticities by utilizing data on actual variations in prices of the good (in this case entrance to a natural area) and resulting actual variations in quantity demanded (visits) at each price. Such estimates for developing country natural area visitation have not been found in the literature, presumably due to a variety of reasons. Commonly, high quality data on visitation levels, as well as other relevant variables, are not available. When they are, they often are not available for sufficiently long periods for time series analysis. In addition, many sites do not charge fees, and those that do rarely adjust their fees sufficiently to estimate a demand curve.

The latter two problems theoretically can be overcome by conducting a cross-sectional analysis rather than a time-series analysis. However, in addition to the problem of limited price variability across sites, it would be very difficult to measure and control for the other variables, such as site quality and proximity to markets, that affect visitation levels (time series analysis also may have confounding variables, but generally will have fewer).

The Costa Rica Case Study

This section presents a time series analysis of visitation at three national parks in Costa Rica. It takes advantage of the relative availability and quality of such data in that country, as well as the changes in entrance fees implemented there. Analysis based on actual fee and visitation levels provides more confidence in evaluating the two hypotheses noted above. It also allows evaluation of a third hypothesis—that elasticities calculated from actual behavior will be the same as those calculated from stated preference surveys, in this case those reported in Chase et al. (1998).

Background on Costa Rica Parks, Tourism, and Fee Issues

Costa Rica is one of the world's most biodiverse countries and, with more than two dozen parks and other protected areas, has preserved more than 10% of the country's primary forests. The country also has experienced rapid growth in international tourism arrivals, due in large part to these national parks. In 1993, tourism became Costa Rica's largest single source of foreign exchange, and 65% of tourists from the US, Canada, and Europe visited national parks during their holidays in Costa Rica (ICT, 1994a, 1994b;

see also Aylward et al. (1996), Chase et al. (1998), Southgate (1998), or Inman et al. (1998) for further information on tourism and national parks in Costa Rica).

As elsewhere, national park funding levels in Costa Rica have not always kept up with increases in the number of parks or visitors, and entrance fees have been increased partly in response to these financial pressures. The first fees to be charged were instituted in 1972 and, at around $0.10, represented little more than a token inconvenience to the tourist (see Table 2 for entrance fee levels over time). Baldares and Laarman (1991) report that a working group was formed by the National Parks Service of Costa Rica in 1989 to revise entrance fees. At the time, fees for both residents and non-residents (foreign tourists) were just 25 colones or from $0.20 to $0.30 at exchange rates prevailing in the late 1980s. Subsequently rates for foreigners were raised to 100 colones ($1.18) in 1990. Steady devaluation of the colón in the 1990s gradually reduced the dollar equivalent of entrance fees, resulting in a doubling of the fee to 200 colones in 1992.

Nevertheless, when a new government took office in May of 1994 the dollar value of the entrance fee was just $1.28. As part of that administration's plan to promote sustainable development in Costa Rica, non-resident fees for entry to all the protected areas were raised to $15 on September 1, 1994. The resulting backlash from the industry, media, local communities and tourists led to two concessions. The first concession was that tourists could purchase entrance in advance (for specific parks) for the reduced fee of $10. This concession had little effect as it required tourists to find their way to the National Park Service headquarters in downtown San José, a not inconsequential task. The tourist industry also succeeded in obtaining a reduced price of $5 for tourists on package tours. This exception was intended to be temporary, and was designed to provide agencies with time to raise package prices. However, as noted in Chase et al. (1998), a black market developed in these $5 tickets, such that their use was not confined to visitors on tours.

In 1995, a pass was created that allowed visits to four parks for $29. In July 1995, the fee was further revised and included differential pricing across parks, based on visitation levels, for advance purchase tickets (the three case study parks were all in the most expensive group, at $10). However, that fee structure was soon changed, in April 1996, to a daily fee for foreigners of $6 applied at all parks.

The three national parks evaluated here (and in Chase et al., 1998) are Volcán Poás (Poás), Volcán Irazú (Irazú), and Manuel Antonio. The first two are active volcanos located approximately two hours from the capital of San José. The latter is a beach park located on the Pacific Coast, about five hours from San José. Because Manuel Antonio is less unique than the volcano parks, one can hypothesize that it would be relatively price elastic.

Background on Data and Analytical Technique

Various independent variables can be hypothesized to affect visitation levels at the case study sites. The nature of the Costa Rican tourism context, and data availability, lead to the following specification:

$$Q = f[P(-), PC(+), A(+)]$$

where expected signs are in parentheses and:

Q = park visits by foreigners
P = park entrance fee for foreigners, in 1982/1984 US$
PC = entrance fee at competing park(s)
A = foreign visitors to Costa Rica (arrivals)

Arrivals (A) is assumed to represent the pool of potential visitors to the parks. For some park-country combinations, A may be a function of P. For example, price levels at the Galápagos National Park in Ecuador may affect the number of arrivals in that country. However, for this analysis, it is assumed that A and P are co-determinants of Q, and that P is not a determinant of A. There was a first-ever drop in arrivals in 1996, and many at least in part blamed the park entrance fees for this drop (e.g., see the CANATUR estimate of lost income blamed on the fee increase, presented above). However, it may also have been due to increased prices amongst general tourism services (Southgate, 1998), a series of high profile kidnaping, or other factors.

Several other variables have been used in models of recreation and tourism demand (Loomis & Walsh, 1997; Witt & Witt, 1992), but were not included here because the focus is not on individual-level factors (e.g., age, education, or income) nor on source market factors (e.g., GDP, population, exchange rates, or travel time to Costa Rica), nor was a cross-sectional approach taken (e.g., site attractiveness or travel time from the San José gateway). Finally, several other variables, such as site congestion, may affect Q, while others, such as crime levels or price levels for general tourism services, may affect A. These were not modeled here due to lack of relevant data.

As noted above and illustrated in Table 2, there were various fees charged after September 1994. The base fee was $15, but visitors on tours paid only $5, and others purchasing the ticket in advance paid only $10. Chase et al. (1998) note that respondents in their sample at the three case study parks paid on average $12.28 at Irazú, $9.85 at Poás, and $9.56 at Manuel Antonio; Poás was low due to the high percentage of visitors coming with tours, while Manuel Antonio was low due to the black market for $5 tickets. In addition, there was fee differentiation for advanced purchase tickets across parks between July 1995 and April 1996 (this fee remained at $10 for each of the case study parks).

It was not possible to determine whether the Chase et al. results were representative of all visitors to these parks during the period, nor to determine the average fee paid at other parks. Therefore, the present analysis uses a fee of $15 for all parks between September 1994 and April 1996, with sensitivity analysis, described below, using the average fees paid from the Chase et al. data set. Due to the lack of data on differential fees, as well as the short duration of the differential fee period, the PC variable is dropped from the equation. Thus, the remaining variables are Q, P, and A. Prices used in the analysis were in US$ (converted from colones for months prior to September 1994) and were adjusted using the consumer price index.

TABLE 2
Entrance Fees to Costa Rican National Parks, 1972 to 1997

	Residents		Non-Residents	
Beginning	Colones	US$	Colones	US$
1972	1	0.11	1	0.11
1978	2	0.23	2	0.23
1982	5	0.13	5	0.13
1984	10	0.21	10	0.21
1985	20	0.39	20	0.39
1986	25	0.44	25	0.44
1990 (April)	50	0.59	100	1.18
1991 (August)	100	0.80	100	0.80
1992 (August)	200	1.57	200	1.57
1994 (September)	200	1.27	At gate: 15	
			Advanced purchase: 10	
			Travel agencies: 5	
1995 (July)	200	1.12	At gate: 15	
			Advanced purchase: 5, 7, or 10	
			Travel agencies: 5	
			4-entry pass: 29	
1996 (April)	200	0.98	6	

Source: Chase et al. (1998); MINAE (1998).

Monthly data from January 1988 to September 1997 were used, with Q and A being seasonally adjusted. Arrivals data are from the Costa Rican Tourism Institute (ICT), visitation data are from the Costa Rican National Parks Service (MINAE), and price data are from MINAE and Chase et al. There were 117 observations for Poás, 111 (six missing values) for Irazú, and 115 (two missing values) for Manuel Antonio. Seasonal adjustment was based on the following simple process. An adjustment factor (AF) was computed for each of the 12 months by dividing the overall monthly average for the series by the average for each month. For example, the overall monthly average for arrivals was 34,787 and the January arrival average was 44,046, so the AF for January arrivals was 0.79. Data for each month were then multiplied by the relevant AF to arrive at the seasonally adjusted data.

Figures 1 and 2 show Q data for Poás and Manuel Antonio. The arrows indicate points of price changes. Reading from left to right, the first reflects the fee increase from 25 to 100 colones, the second the increase from 100 to 200 colones, the third the increase from 200 colones to $15 ($10 for advanced purchase and $5 for travel agencies), the fourth the price differentiation across parks, and the last the decrease from $15 to $6. A comparison of the figures suggests that price responsiveness at Manuel Antonio was greater than at Poás. In general, visitation at Poás does not appear very re-

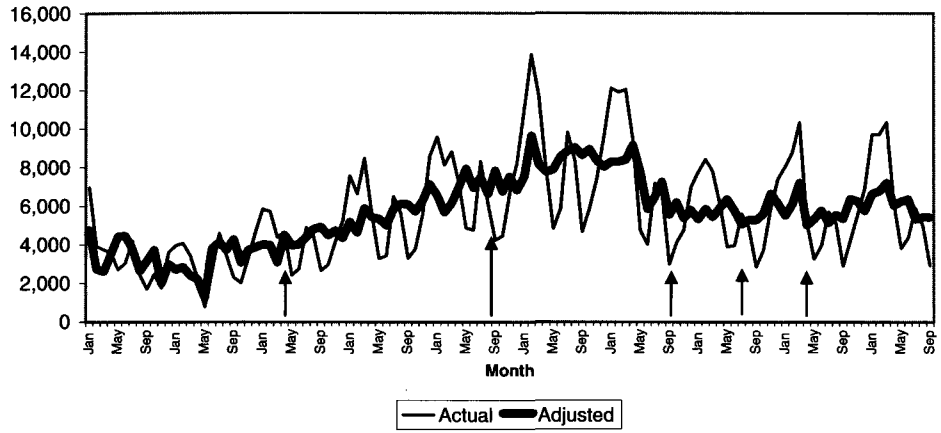

Figure 1. Foreign Visitation at Poas NP (actual and seasonally adjusted, 1988 to 1997).

sponsive to either fee increases or decreases. For both parks, the large fee increase of September 1994 corresponded with the annual drop in visitation during the August to September transition. Seasonal adjustment incorporates these annual cycles and provides a more accurate picture of fee responsiveness than does a month-to-month evaluation of the raw data.

Model Estimation and Results

Initial models were estimated for each park using ordinary least squares, with both Q and P in both linear and natural logarithmic form. For all three parks, the model with the highest adjusted R^2 was linear in Q and log in P, and these models were retained for further analysis. Durbin-Watson statistics

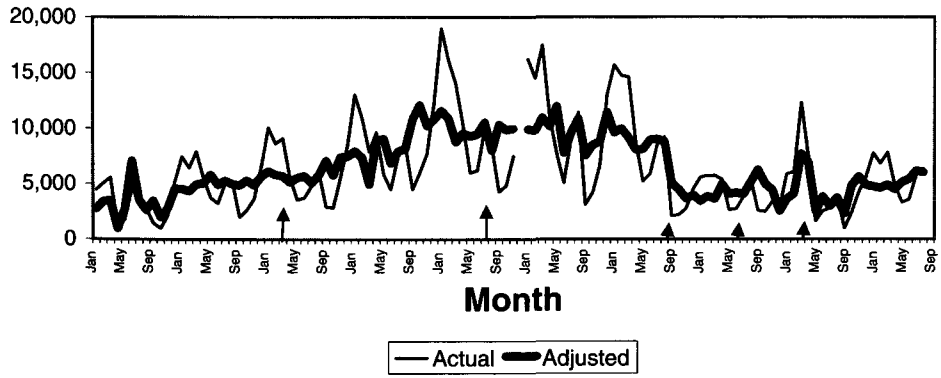

Figure 2. Foreign Visitation at Manuel Antonio NP (actual and seasonally adjusted, 1988 to 1997).

indicated autocorrelation, so this was corrected using the Cochrane-Orcutt approach. The correlation between the P and A variables was 0.857, which could indicate multicollinearity (it also supports the assumption above that arrivals generally do not decrease in response to fee increases). If present, multicollinearity would not bias parameter estimates, but would inflate standard errors. Therefore, actual parameter significance likely is greater than that indicated below.

Model results and elasticities are presented in Tables 3 and 4, respectively. Each of the models fit well, though the price coefficient was not significant in the Poás model. This may be due in part to multicollinearity, but more likely it reflects a lack of responsiveness to prices on the part of Poás visitors. Review of Figure 1, and comparison with Figure 2, provides visual support for this phenomenon. The price coefficients were highly significant in the other two models.

To test the sensitivity of results to the price used during the September 1994 to April 1996 period, the Poás and Manuel Antonio models and elasticities were re-estimated at $5 using the Chase et al. (1998) figures for average fee paid ($9.85 and $9.56, respectively, rather than $15). This increased the Poás elasticity to −0.0616 and the Manuel Antonio elasticity to −0.289. Nonetheless, estimated demand remains inelastic. The results shown in Tables 3 and 4 are consistent with the first hypothesis—that foreign visi-

TABLE 3
Estimated Models for Three Costa Rican National Parks

Park	Constant Coefficient	*P*-Value	Ln Price Coefficient	*P*-Value	Arrivals Coefficient	*P*-Value	Adj. R^2
Poás	1859	0.049	−267.0	0.226	0.1095	0.000	.812
Irazú	577.8	0.451	−603.0	0.001	0.07151	0.001	.770
Manuel Antonio	3723	0.037	−1092	0.009	0.07873	0.111	.724

Note: All coefficients given to four significant digits.

TABLE 4
Estimated Elasticities for Three Costa Rican National Parks

Park	Elasticity at $5	Elasticity at $10	Elasticity at $20
Poás	−0.0513	−0.0530	−0.0549
Irazú	−0.296	−0.366	−0.485
Manuel Antonio	−0.238	−0.281	−0.345

Note: All elasticities are given to three significant digits and are calculated based on a $1 increase from the stated amount (larger increases, such as a $4 increase from $20, led to slightly more elastic values, as would be expected from the general increase in elasticity as price increases).

tation at developing country parks is inelastic. Though the present results are only for three parks in one country, combined with the results from other studies, they lend support to the first hypothesis.

The second hypothesis is also generally supported. As expected, demand for Manuel Antonio is more elastic than that for Poás, as the former is a less unique attraction. However, demand for Irazú also is more elastic than that for Poás'. This may result from several factors, including Poás" relative proximity to San José, that it provides both rainforest trails and a volcano, and that it has a relatively high proportion of visitors on tours, which could lead to the fee being less "visible" there, as discussed above. A Chow test (Chow, 1960), with ordinary least squares, was used to test for equality of the Poás and Irazú regression models. The Chow statistic (174.92, with 3/222 df) exceeded the critical value, such that equivalence of the two models is rejected.

Results are not consistent with the third hypothesis in that elasticities found here are much lower than those found in the Chase et al. (1998) contingent behavior analysis. Moreover, the relative elasticities also differ, with Chase et al. finding demand at Poás to be the most elastic, while present results indicate it is the least elastic. This discrepancy suggests that the contingent behavior approach may overestimate price responsiveness. As noted by Chase (1998), there may be several explanations for the discrepancy, including differences in functional form and different data ranges (the contingent behavior analysis included a high fee of $35). In some comparisons, differences in the prices at which elasticities were estimated could also be a cause, but the range of prices at which the present elasticities were calculated (Table 4) include the price at which the Chase et al. estimates were calculated.

Perhaps the most likely cause is that visitors had full information on fees at the decision point (time of survey) in the contingent behavior study, while in reality most of the visitors apparently did not know the actual entrance fee at the point of their decision to visit the parks. Almost three-quarters of visitors did not know the fee at the time of arrival at the respective park. By this point, visitors had made a psychological, financial, and time commitment to their visits—these were sunk costs in reality, but variable costs in the Chase et al. survey. Moreover, substitutes were clear to respondents in the Chase et al. survey, but presumably were less apparent or available to visitors faced with a higher-than-expected fee upon arrival. Fee increases would be expected to have greater effect in the long-run, as actual and expected fees converged. However, such convergence may not have been possible in the rapidly changing 1994-1996 period in Costa Rica. Visual inspection of Figure 2 suggests that the greatest price reaction occurred at the time of the September 1994 fee increase, with little or no delayed reaction. This is supported by further analysis of the data using 3, 6, 9, 12, 15, and 18-month lags on the price variable. Of the 18 lag coefficients (three models, six lags each), only the 18-month lag for Manuel Antonio was significant at $p = 0.05$.

Finally, it should be noted that the semilog functional form fit the data best, which suggests that demand for visits at these parks is not of constant

elasticity, but rather of increasing elasticity at higher fee levels. This is consistent with assertions that demand will be inelastic at low fee levels.

Conclusion

As always, the results found here are dependent on the contexts of the case study parks, as well as on the quality of the data. Though data quality in Costa Rica is higher than in many countries, the impossibility of accurately determining prices paid during the September 1994 to April 1996 period, as well as the lack of data on possible substitution behavior, leads to caution in interpreting results. Therefore, analyses of other nature tourism sites are encouraged. Ideally, these analyses will also include data on expected prices (e.g., obtained from visitor surveys) as well as actual prices and/or will evaluate possible lag effects to allow for convergence of expected and actual prices.

Despite these limitations, the results clearly indicate price inelasticity of demand at fee levels up to and beyond $10. This is consistent with the findings of many stated and revealed preference studies of foreign visitation at developing country parks, as well as with studies of visitation at US and Australian parks (keeping in mind that the present results, as well as many of those from other studies in developing countries, are only for foreign visitors). Price inelasticity indicates that revenue may be increased significantly with (relatively) little effect on visitation levels. Although it is common to provide estimates of revenue-maximizing fees, it is more realistic to provide price/visitation/revenue figures for fees in the $1 to $20 range. These are shown in Table 5, using the models from Table 3 and the mean for monthly arrivals from January 1996 through September 1997 (this figure, 46,189, is higher than the mean for the overall 1988-1997 series).

Though these estimates suggest that revenues to the parks will increase over this price range, they also show the expected drop in visitation resulting from price increases. As indicated by the elasticity estimates, such drops will not be as large, in percentage terms, as the price increases. However, they

TABLE 5
Estimated Visitation and Revenue at Various Price Levels

	Foreign Visits (monthly)			Revenues from Foreign Visits ($ '000s, annual)		
Price ($)	Poás	Irazú	Manuel Antonio	Poás	Irazú	Manuel Antonio
1	6,917	3,881	7,359	83	47	88
5	6,487	2,910	5,602	389	175	336
10	6,302	2,492	4,845	756	299	581
15	6,194	2,248	4,402	1,115	405	792
20	6,117	2,074	4,088	1,468	498	981

can have substantial impact on visitation, and thus on businesses and communities dependent on this visitation.

The variation across parks reflects variation in elasticity and can, depending on management objectives, be used to set differential fees. Though data were not available to examine substitution across sites within Costa Rica, the general finding of inelasticity suggests that use of fees as a rationing tool may be limited unless managers are willing to set fees at levels higher than the present $6 level (for a discussion of the use of differential fees to achieve revenue or other management goals in the developing country context see Chase et al., 1998 or Lindberg, 1998). The limited empirical understanding of the site specificity of elasticity in developing countries, and the implications of this specificity, indicate that additional studies will be necessary to ensure an informed basis for fee policy.

Lastly, the results suggest that stated preference analysis may generate results that differ from actual behavior, with one likely explanation being differences in the amount and timing of information regarding prices and substitutes. Though reminders of substitutes have been specifically recommended for CVM applications (Arrow et al., 1993), too much information may also be problematic. Insofar as actual behavior is the criterion for validity, results from stated preference studies need to be treated with some caution, especially when information provision leads to choice scenarios that differ from "real world" choice situations. Due to data limitations or other considerations (such as the desire to model hypothetical changes in site quality), the stated preference approach is an important tool. Nonetheless, further analysis of actual behavior is warranted to provide the most valid information regarding the effect of fee policies for nature tourism sites in developing countries.

References

Adams, R. L., Lewis, R. C., & Drake, B. H. (1973). *Outdoor Recreation in America: An Economic Analysis.* Washington, DC: Bureau of Outdoor Recreation, U.S. Department of the Interior.

Arrow, K., Solow, R., Portney, P., Leamer, E., Radner, R., & Schuman, H. (1993). Report of the NOAA Panel on Contingent Valuation. *Federal Register 58*:4602-4614.

Aylward, B., Allen, K., Echeverría, J., & Tosi, J. (1996). Sustainable Ecotourism in Costa Rica: the Monteverde Cloud Forest. *Biodiversity and Conservation 5*:315-343.

Baldares, M. J., & Laarman, J. G. (1991). User Fees at Protected Areas in Costa Rica. In J. R. Vincent, E. W. Crawford, & J. P. Hoehn (Eds.) *Valuing Environmental Benefits in Developing Countries.* Special Report 29. East Lansing, MI: Michigan State University.

Barnes, J. I. (1998). Wildlife Economics: A Study of Direct Use Values in Botswana's Wildlife Sector. Ph.D. Thesis, University of London.

Brandon, K. (1996). *Ecotourism and Conservation: A Review of Key Issues.* World Bank Environment Department Paper No. 033. Washington, DC: World Bank.

Brown, G., Swanson, T., & Ward, M. (1994). Optimally Pricing Game Parks in Kenya. Unpublished manuscript.

Central Bank [Belize] Research Department. (1992). Report on the 1991/1992 Winter Tourist Expenditure Survey. Unpublished manuscript.

Chase, L. (1995). Cuotas de Entrada a los Parques Nacionales en Costa Rica. Unpublished manuscript.

Chase, L. (1998). Personal communication.

Chase, L. C., Lee, D. R., Schulze, W. D., & Anderson, D. J. (1998). Ecotourism demand and differential pricing of national park access in Costa Rica. *Land Economics 74*:466-482.

Chow, G. (1960). Tests for Equality Between Sets of Coefficients in Two Linear Regressions. *Econometrica 28*:591-605.

Clark, C., Davenport, L., & Mkanga, P. (1995). Designing Policies for Setting Park User Fees and Allocating Proceeds Among Stakeholders: The Case of Tarangire National Park, Tanzania. Report to the World Bank.

Edwards, S. F. (1987). *An Introduction to Coastal Zone Economics: Concepts, Methods, and Case Studies.* New York: Taylor & Francis.

Giongo, F., Bosco-Nizeye, J., & Wallace, G. N. (1994). *A Study of Visitor Management in the World's National Parks and Protected Areas.* Report published by Colorado State University, The Ecotourism Society, The World Conservation Union, and The World Conservation Monitoring Centre. Available from The Ecotourism Society, North Bennington, Vermont.

Harris, C. C., & Driver, B. L. (1987). Recreation User Fees: Pros and Cons. *Journal of Forestry* May:25-29.

Inman, C. (1998). The Case of Ecotourism in Costa Rica. In K. von Moltke, et al. *Global Product Chains: Northern Consumers, Southern Producers, and Sustainability.* Nairobi: United Nations Environment Program (UNEP).

Instituto Costarricense de Turismo [ICT]. (1994a). Anuario Estadístico de Turismo 1993. Departamento de Desarrollo, Area de Estadísticas. San José, Costa Rica.

——— [ICT]. (1994b). Encuesta Aérea de Extranjeros, Epoca Alta Turlística 1994. Departamento de Desarrollo, Area de Estadísticas. San José, Costa Rica.

Kahneman, D., & Tversky, A. (1982). The Psychology of Preferences. *Scientific American 246*:160-173.

Keith, J., Fawson, C., & Chang, T. (1996). Recreation as an Economic Development Strategy: Some Evidence from Utah. *Journal of Leisure Research 28*(2), 96-107.

Knapman, B., & Stoeckl, N. (1995). Recreation User Fees: An Australian Empirical Investigation. *Tourism Economics 1*(1), 5-15.

Laarman, J. G., & Gregersen, H. M. (1996). Pricing Policy in Nature-Based Tourism. *Tourism Management 17*(4), 247-254.

Lawson, R., Gnoth, J., & Paulin, K. (1995). Tourists" Awareness of Prices for Attractions and Activities. *Journal of Travel Research 34*:3-11.

Lee, D. N. B., & Snepenger, D. J. (1992). An Ecotourism Assessment of Tortuguero, Costa Rica. *Annals of Tourism Research 19*, 367-370.

Lindberg, K. (1998). Economic Aspects of Ecotourism. In K. Lindberg, M. Epler Wood, & D. Engeldrum (Eds.), *Ecotourism: A Guide for Planners & Managers*, Volume 2. N. Bennington, VT: The Ecotourism Society.

Lindberg, K., Enriquez, J., & Sproule, K. (1996). Ecotourism Questioned: Case Studies from Belize. *Annals of Tourism Research 23*(3), 543-562.

Loomis, J. B. (1995). Four Models for Determining Environmental Quality Effects on Recreation Demand and Regional Economics. *Ecological Economics 12*, 55-65.

Loomis, J. B., & Walsh, R. G. (1997). *Recreation Economic Decisions: Comparing Benefits and Costs* (2nd ed.). State College, PA: Venture.

MacIntosh, B. (1984). Visitor Fees in the National Park System: A Look Back. *Trends 21*(4), 4-8.

Maille, P., & Mendelsohn, R. (1993). Valuing Ecotourism in Madagascar. *Journal of Environmental Management 38*, 213-218.

Menkhaus, S., & Lober, D. J. (1996). International Ecotourism and the Valuation of Tropical Rainforests in Costa Rica. *Journal of Environmental Management 47*, 1-10.

Mercer, E., Kramer, R., & Sharma, N. (1995). Rain Forest Tourism: Estimating the Benefits of Tourism Development in a New National Park in Madagascar. *Journal of Forest Economics 1*, 239-269.

Mitchell, R. C., & Carson, R. T. (1989). *Using Surveys to Value Public Goods: The Contingent Valuation Method.* Washington, DC: Resources for the Future.

Moran, D. (1994). Contingent Valuation and Biodiversity: Measuring User Surplus of Kenyan Protected Areas. *Biodiversity and Conservation 3*, 663-684.

Navrud, S., & Mungatana, E. D. (1994). Environmental Valuation in Developing Countries: The Recreational Value of Wildlife Viewing. *Ecological Economics 11*, 135-151.

Nicholson, W. (1992). *Microeconomic Theory: Basic Principles and Extensions* (5th ed.). Fort Worth, TX: Dryden Press.

Schultz, S., Pinazzo, J., & Cifuentes, M. (1998). Opportunities and Limitations of Contingent Valuation Surveys to Determine National Park Entrance Fees: Evidence from Costa Rica. *Environment and Development Economics 3*:131-149.

Siderelis, C., & Moore, R. L. (1998). Recreation Demand and the Influence of Site Preference Variables. *Journal of Leisure Research 30*(3), 301-318.

Southgate, D. (1998). *Tropical Forest Conservation: An Economic Assessment of the Alternatives in Latin America.* New York: Oxford University Press.

Tversky, A., & Kahneman, D. (1986). Rational Choice and the Framing of Decisions. *Journal of Business 59*, S251-S278.

US Department of Interior and Departument of Agriculture [USDI and USDA]. (1999). Recreation Fee Demonstration Program: Progress Report to Congress Fiscal Year 1999.

Van Sickle, K., & Eagles, P. F. J. (1998). Budgets, Pricing Policies and User Fees in Canadian Parks" Tourism. *Tourism Management 19*(3), 225-235.

Witt, S. F., & Witt, C. A. (1992). *Modeling and Forecasting Demand in Tourism.* London: Academic Press.

World Bank. (1997). *World Development Report.* New York: Oxford University Press.

World Resource Institute, World Conservation Union, and United Nations Environment Programme [WRI/IUCN/UNEP]. (1992). *Global Biodiversity Strategy: Guidelines for Action to Save, Study, and Use Earth's Biotic Wealth Sustainably and Equitably.* WRI/IUCN/UNEP.