APPLICATION OF TRAVEL COST METHOD TO ASSESS THE PRICING POLICY OF PUBLIC PARKS: THE CASE OF KAZIRANGA NATIONAL PARK

Abinash Bharali[1] and Ritwik Mazumder[2]

National parks are established to preserve wildlife or biodiversity. But conservation often displaces local communities and has the potential of raising their distress levels. "Ecotourism" helps in the conservation of natural resources or services and raises the standards of living of the local people. But unregulated tourism creates problems in preservation of the wildlife of public parks especially in developing countries. In recent years Kaziranga National Park has faced these problems and the park authority may possibly use revenue maximizing entry fee as an effective instrument. In this study the Zonal Travel Cost method is used to estimate the revenue maximization entry fee. The study is based on primary data collected from 300 visitors during the winter of 2010-11. The total recreational value of the park is estimated at ₹ 773.45 million. Revenue maximization entry is estimated at ₹ 187.6 per visitor per visit assuming zero entry fees. By introducing this revenue maximization entry fee the park authority can ease the tourist pressure to a certain extent. The additional revenues may be used for conservation of the wildlife and biodiversity. By conducting well-crafted publicity campaign for other parks and sanctuaries in Assam it is possible to divert a large chunk of visitors towards other national parks. This would generate additional funds that can be directed towards the preservation of the wildlife and biodiversity.

INTRODUCTION

National parks and Sanctuaries are established and developed to preserve the unique wildlife or biodiversity of the local areas. But these efforts often displace the local communities and make them poorer. For this purpose various efforts were made including legislations to minimize the human interference in these areas. But these efforts did not prove to be as effective as they were expected to be. This necessitated the development of novel strategies like "Ecotourism" which has the potentiality of integrating the conservation of natural resources or services with the development of the local people. But in some cases unregulated tourism creates various problems in the preservation of the wildlife of the public parks especially in the developing countries. Market also fails or the market misprices or under-prices these resources because these are characterized by non-excludability and externalities, which prevents the market price from capturing the correct signals about the true economic value. In an economy, the resources are allocated according to the value of the assets. Without proper estimation of value, resources are bound to be misallocated. To estimate the true economic value of the public parks non-market valuation methods are appropriate.

Kaziranga National Park is the home land of Indian one-horned rhinoceros along with many other species. It is located on the banks of the mighty Brahmaputra River, Assam covering an area of approximately 430 square kilometers (sq-km). There are proposals of adding an area of 454.50 sq-

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km by including the Brahmaputra River in the north and part of the Miker Hills in the south. With the passing of the Assam National Park Act of 1968, Kaziranga became a National Park on January 01, 1971. In 1985 it was notified as World Heritage Site by UNESCO. Kaziranga National park is not kept open for tourists for the entire part of a year. Its visiting season is mid-November to early April as because during monsoons, the Brahmaputra River overflows, flooding the low-lying grasslands of the park. In 2010, there were 497 employees providing services for the preservation of wildlife in Kaziranga National Park. It is too small staff strength as compared to the area of the park. The forest guards are not well equipped with arms and moreover they do not get their wages/salaries regularly. In 2011 many of the home guards who were temporarily appointed as forest guards left their jobs because they were not paid their salaries for five to six months in succession.

Tourists come from various part of the world for viewing the unique wildlife and biodiversity of the national park. In 2005-06 the total tourists flow was 54,326, which increased to 109,606 in 2009-10. On an average 5 percent of the tourists are foreigners. The Kaziranga National Park (KNP) has been suffering from over-exposure in recent years. In the southern part of the Kaziranga National Park, almost seventy private and public hotels and lodges (there are only four Government lodges) have been constructed providing hospitality services to the visitors. However most of the hotels and lodges are not owned by the local people. The haphazard growth of tourism related infrastructure, especially unchecked expansion of tourism and hospitality industry on the southern boundary of the park, is blocking traditional animal corridors. The 54 km stretch of the National Highway 37 running parallel to the southern boundary of the Kaziranga, divides the park between the low-lying grasslands in the north and the elevated Karbi Anglong hills in the south. During rainy season when much of the park is flooded by the Brahmaputra the animals migrate from the low lying grasslands to the hills using these corridors by crossing National Highway 37. Many wild animals are killed by vehicles every year while attempting to cross the highway. There are 23 villages surrounding the park along with four tea gardens. Another 30 villages are located in the vicinity. The total human population in the immediate surroundings of the park is about 70,000 according to the 2001 census report. The tea gardens located near the park boundaries also create a threat to the preservation of wild life through pesticide run-off. Hathikuli Tea Estate is a typical example. During the last 50 years large scale habitat changes in the Karbi plateau include expansion of tea gardens, human settlement, logging and *jhum* (shifting agriculture) cultivation. One impact is that the gap between the park and the plateau is increasing and suitable habitat of wildlife is being destroyed. In 2010, altogether 68 rhinos, 11 elephants and 5 tigers had died in the park due to various reasons such as disease, poaching, unregulated tourism infrastructure expansion, road mishaps, floods, encroachment by tea gardens, shifting cultivation, rising human settlements and so on.

Unregulated tourism industry in the park has created several problems in pursuing the main objectives of establishment of KNP – namely conservation of biodiversity. Four National Parks and nine Sanctuaries have been established in Assam to preserve wildlife and biodiversity of the region. But the tourist inflow pressure is much higher in KNP as compared to the other National Parks and Sanctuaries in Assam. The tourist inflow data of the last two years shows that more than 0.1 million visitors visit KNP per year, but in the other parks and sanctuaries the tourists inflow pressure is less than even 0.05 million per annum. The focus of government and other

organizations should remain on the core aspect of the establishment of the park (to keep KNP as a safe haven for wild-life) and not on pure commercial aspects like hotel construction to accommodate more tourists. Thus there is an urgent need for a strategic shift of policy on the part of the Tourism and Forest departments so that a segment of the tourist inflow can be diverted towards other parks and sanctuaries to lessen the pressure on KNP. The main objective of this paper is to examine the role of entry fee in pursuing the prime objective of the establishment of the park.

Since the 1970s and the 1980s a large number studies have been devoted to developing the literature on non-market valuation methods and its applications in various fields of environmental economics studies, especially in valuing environmental goods and services besides environmental damages and hazards. To measure the recreational value of environmental resources and services both Travel Cost Method (Rockel and Kealy, 1991; Guha and Ghosh, 2009; Khan, 2004, Chaudhary and Tewari, 2008; Chopra, 2004) and Contingent Valuation Method (Bowker and Stoll, 1988; Marawila and Thibbotuwawa, 2010; Cook and Cable, 1990, Kadekodi, 2004) have been used. On the other hand some studies have used both methods simultaneously to estimate the monetary value of the same environmental resources (Navrud and Mungatana, 2004; Herath and Kennedy, 2004; Jabarin and Damhoureyeh, 2006; Chaudhary and Tewari, 2006) and compare the estimates of these two different methods.

METHODOLOGY FOR ZONAL TRAVEL COST METHOD (ZTCM)

The travel cost model is generally used to estimate the recreational value or use value of environmental resources, amenity or services. The ZTCM can be applied to the recreational sites which receive few multiple visits by the same visitor (Tobias and Mendelsohn, 1991; Guha and Ghosh, 2009). Most of the visitors visit the Kaziranga National Park once in a year or two or three times during his whole life time, so in this study ZTCM is used. The demand function or Trip-Generating Function (TGF) which will be estimated in this study can be written as

$$VR_i = f(TC_i, HHI_i, AGE_i) \quad \ldots\ldots\ldots\ldots\ldots\ldots (1)$$

where, VR_i = Visitation rate of *i*-th zone, which can be calculated by $VR_i = (N_i/P_i) \times 100000$

N_i = Estimated number of visitors of the zone *i*

P_i = Total population of the zone *i*

TC_i = Average Total Cost of the trip which includes the total travel cost from the place of origin or the *i*-th zone to the Kaziranga National Park (KNP), cost of fooding and lodging, other miscellaneous expenditure.

HHI_i = Average House Hold Income of visitors of zone *i*

AGE_i = Average Age in Years of visitors of zone *i*

When the total travel cost is calculated in the ZTCM, the opportunity cost of travel time and the on-site time spent is excluded because the opportunity cost of travel time can be valued at a fraction (usually between ½ and ¼) of the wage rate [Becker (1965), Cesario (1976)] but the surveys provide data on household income rather than the hourly wage rate of the visitor; inferring wage rates by dividing household income by some estimate of hours worked will introduce measurement error (Freeman, 1993). This can be estimated only for the fixed worked hour's

labors. And according to McConnell (1992), the inclusion of on-site time create problems, as spending more time at a site should enhance the value of the visit, while simultaneously increasing the (time) cost. This dual role of on-site time creates a problem for travel cost demand estimation and therefore various researchers advocate to exclude this time cost (Ward and Beal, 2000; Whitten and Bennett 2002) from the demand model. In many studies the duration of stay of different visitors in the site is taken as independent variable because this variable greatly affects the travel costs of the visitors. But in this study we do not consider it as an independent variable because 86% of the total sample visitors stay one day in the Kaziranga National park.

The consumer surplus (CS) is the difference between the estimated demand prices and the actual expenses that the visitor incurs during the whole trip. The aggregate consumer surplus has to be estimated with the help of the estimated TGF. The TGF takes the form as follows for zone 'j'

$$lnVR_j = CONST + \beta_1 lnTC_j + \beta_2 HHI_j + \beta_3 AGE_j \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (2)$$

$$= \beta_1 lnTC_j + Z_j \qquad (\text{Assuming } Z_j = CONST + \beta_2 HHI_j + \beta_3 AGE_j)$$

Or, $$VR_j = TC^{\beta_1}.e^{Z_j} \qquad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3)$$

To estimate the aggregate surplus at first consumer surplus for each zone has to be estimated. For this purpose, a 'choke price' which represents that maximum value of travel cost for which estimated visitation rate falls to zero can be calculated for each zone using the estimated TGF or using equation (3). Then the consumer surplus (per 100,000 population) is estimated for zone j as follows:

$$= e^{Z_j} \int_{T_j^0}^{T_j^C} TC^{\beta_1} d(TC)$$

$$= e^{Z_j} \frac{1}{\beta_1 + 1} [T_j^{C^{\beta_1+1}} - T_j^{0^{\beta_1+1}}]$$

The total recreational value of the Kaziranga National Park is measured by summing the total consumer surplus and the total actual expenses of the visitors on this trip that is the whole area under the demand curve for visits to the park.

SURVEY DESIGN AND SAMPLING

In this study, both primary and secondary data are used to estimate the value of the park. Information was collected in three distinct sets. In the Kaziranga National Park, every visitor/group must produce their entry permits at the checkpoints. These permits contain information on number of visitors and their respective places of origin (addresses). Firstly the study uses this secondary data for all visitors of the month of January (2011). This part of the year is chosen as because it is the peak tourist season for visiting the park. The zonal distribution of the tourists for this particular period is shown in Table 1. It is assumed that this zonal distribution of visitors is applicable during the entire year. Using this zonal distribution of tourists all visitors are divided into 8 zones. The second data set was collected from the Census report, 2001 of India and it comprises of zonal population of different zones that are assumed in the study.

The third set of data is primary data which comprises of travel cost and other individual household level information obtained by interviewing a sample of 230 visitors. The survey for this purpose was conducted simultaneously during the same period. Sampling is a critical issue here as because tourist's visitation rate is a flow concept. Moreover there is no certainty regarding the period during which the park can be kept open for visitors because of the occurrence of frequent floods in the region. While some researchers have used stratified sampling from total population (Choe, 1996), others prefer random sampling from user group only (Farber, 1988). In order to estimate the total universe of visitors, visitors entry records in the last three years (i.e., from 2007-08 to 2009-10) were used and it was found that on an average 255 tourists visited the park per day during the peak season. In the present paper, 300 visitors were selected randomly and interviewed after their visitation using a well structured pretested survey schedule. A single respondent from each visiting group or family was chosen for interview. This is just 4% of the average total tourist flow to the park in a particular winter month (Jan, 2011) during the last three years.

Table 1

Zonal Distribution of the Visitors of the Park

Sl No	Place of Origin of the Visitors or Zones	No of Visitors	Percentage
1	Upper Assam (Composition of Tinsukia, Dibrugarh, Sivasagar, Dhemaji, Lakhimpur and Jorhat districts)	2095	22.29%
2	Middle Assam (Composition of Golaghat, Sonitpur, Karbi Anglong, Nagaon, Marigaon districts)	2708	28.8%
3	Lower Assam (Composition of Darrang, Kamrup, Nalbari, Barpeta, Bongaigaon, Goalpara, Kokrajhar, Dhubri, Kamrup Metropolitan, Baksa, Udalguri and Chirang districts)	1520	16.17%
4	South Assam (Composition of North Cachar Hills, Cachar, Hailakandi and Karganj districts)	19	0.2%
5	Other North Eastern States Excluding Assam	268	2.85%
6	West Bengal	1772	18.85%
7	Other States of India Excluding West Bengal and NER states	681	7.24%
8	Other Countries of the World Excluding India	337	3.58%
Total		9400	

Source: Forest Department, KNP, 2011

RESULTS

The OLS regression is used to estimate the trip generating function (TGF) in this study. At first in the TGF various socio-economic variables of the visitors (such as average household income, average travel cost, average age, educational level, sex family size) are taken as independent variables, but all these variables are not significant. In the final regression model only those variables are kept which are significant.

Generally in ZTCM, that functional form is used which gives the most suitable results and here experiments with different alternative forms have been carried out and found that a double-log between visitation rate and travel cost as the most suitable to estimate the TGF. The estimates of three different models are shown in the Table 2. The TGF takes the following form

$$\boldsymbol{lnVR} = 30.37 - 2.3208\,(\boldsymbol{lnATC}) + 0.0000197(\boldsymbol{AHI}) - 0.1466(\boldsymbol{AGE})$$

From this equation it can be easily concluded that there is an inverse relationship between the travel costs of a particular trip and visitation rate (VR), which reflects the law of demand. It also reflects that average household income of the visitors positively affects the VR and average age negatively affects it.

Table 2

The OLS Estimation of the TGF

Variables	Linear Model		Log Linear Model		Double Log Model	
	Coefficient	t-value	Coefficient	t-value	Coefficient	t-value
Constant	16713.0724	5.1223*	24.7186	4.553*	30.3701	30.993*
In TC	0.0212	0.3432	-0.0000246	-0.2387	-2.3208	-11.5069*
HHI	-0.0209	-0.6942	-0.0000195	-.3896	0.0000197	4.2769*
AGE	-336.1971	-4.8097*	-0.4047	-3.4794	-0.1466	-4.8969*
R^2	0.87		0.88		0.99	
F	9.69		10.28		389.19	

*Note: *significant at 1% level of significance*
Source: Authors' calculations.

CONSUMER SURPLUS ESTIMATION

The estimated consumer surplus for the different eight zones is shown in the table 3 and sum of these surpluses is considered as the value of the recreational services of the Kaziranga National Park by the visitors of the park. The total consumer surplus is estimated to be ₹ 2.79 million and this estimate signifies the value of the benefits that the visitors derived from visiting the park. This surplus also indicates the amount that the visitors are willing to pay over their actual cost to participate in the recreational activities of the National Park. By summing up the total consumer surplus and the total actual travel cost of visit, the total recreational value of the park can be estimated. The total recreational value of the Kaziranga National Park (shown in Table 3) is found ₹ 773.451 million.

Table 3

Estimation of Consumer Surplus and Recreational Value

Sl. No	Zones	Consumer Surplus (in ₹ millions)	Total Recreational Value (in ₹ millions)
1	Upper Assam	0.637786	61.047
2	Lower Assam	0.927478	78.9
3	Middle Assam	1.06047	33.75
4	South Assam	0.001076	0.849
5	NER States excluding Assam	0.03259	10.787
6	West Bengal	0.111759	165.127
7	Other States of India	0.011233	110.594
8	Foreigners	0.00902	312.397
Total		***2.7914***	***773.451***

Source: Same as Table 2.

REVENUE MAXIMIZATION ENTRY FEE ESTIMATION

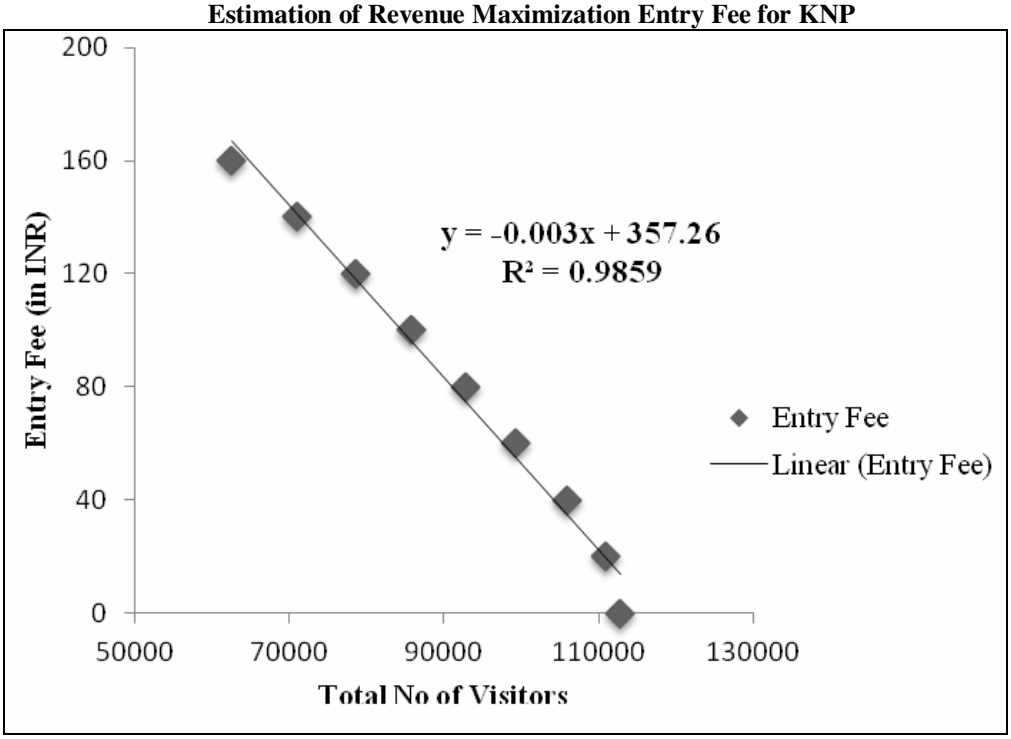
The park authority of KNP introduced two different types of entry fees for visiting the park at present and authority collect ₹ 20.00 from the Indian visitors and from the foreigners ₹ 250.00. By introducing these two different levels of entry fee the authority collects ₹ 3.18 million revenues in 2010-2011, which is suboptimal because the visitor's willingness to pay is much more than their

actual expenses. With the help of the Travel Cost Method, it is possible to estimate an entry fee for the Park that can maximize revenue collection for the authority. By changing the per capita travel cost (representing equal changes in entry fee) in the TGF, we get sets of estimated number of visitors corresponding to different entry fees and this generates a demand curve. At the middle point of the demand curve the revenue is maximum. The estimated number of visitors against various entry fee levels is shown in the Figure 1 assuming that the park authorities have not introduced any entry fees for visiting the park at present. It is thus found that ₹ 187.6 per visitor per day can be increased by the park authorities over and above the current level of entry fee to maximize the revenue collection. By introducing these new levels of entry fees the authority can collect ₹ 24.3 million as revenue which is far higher than the current level of revenue collection.

This additional amount of revenue can be used for the preservation activities of the unique wild life of the park especially by technological up-gradation and by recruitment of skilled scientists, ecologists and animal experts. Finally it is evident from the demand schedule that by increasing the entry fee to the extent mentioned the tourists flow pressure to the park can be reduced to 0.06 million.

Figure 1

Estimation of Revenue Maximization Entry Fee for KNP



Source: Author's Calculation

CONCLUSIONS

Kaziranga National Park is an eco-tourism destination in the North-East. Keeping in view the large amount of consumer surplus and the recreational value of the park, the Union Government and the State Government of Assam should allocate large budgetary resources for the preservation of the park. By introducing the revenue maximizing entry fee on the visitors of, the park

authorities can solve two major problems relating to the park, that is, lack of funds and tourist inflow pressure. Now, as mentioned in the introductory section the bulk of tourists interested in wild-life tourism, mainly visit Kaziranga but not other national parks and sanctuaries in Assam. The other parks and sanctuaries also have their unique wildlife and biodiversity, but these are not famous among the tourists because of their dearth of knowledge which in turn is due to lack of publicity. If a well-crafted publicity campaign is conducted for the promotion of these other parks and sanctuaries, besides introducing the revenue maximization entry fee in Kaziranga, then a large chunk of visitors would be forced to think beyond Kaziranga and visit other parks and sanctuaries of Assam. If the Government is successful in doing this, it can generate additional funds that may be utilized for the preservation of wildlife and biodiversity of not only KNP but other national parks and sanctuaries of Assam as well. Thus, in final conclusion this paper suggests that the Government should develop scientifically sound management policy for the preservation of the park and for this very purpose an optimum level of entry fee should be imposed on the visitors of the park.

References

Bateman, I. and K. Willis (eds) (1995) 'Valuing Environmental Preferences: Theory and Practice of the Contingent Valuation Method', Oxford: Oxford University Press

Becker, G. (1965) 'A theory of the allocation of time', The Economic Journal, Vol. 75, No. 299, pp. 493-517

Braden, J. and C. Kolstad (eds) (1991) 'Measuring the Demand for Environmental Quality', Amsterdam: North-Holland

Cameron, T.A. (1992) 'Combining Contingent Valuation and Travel Cost Data for the Valuation of Nonmarkets Goods', Land Economics, Vol. 68, No. 3, pp. 302-317

Cesario, F. (1976) 'Value of time in recreation benefit studies', Land Economics, Vol. 52, No. 1, pp. 32-41

Chaudhry, P. and V.P. Tewari (2006) 'A Comparison between TCM and CVM in Assessing the Recreational Use Value of Urban Forestry', International Forestry Review, Vol. 8, No. 4, pp. 439-448

Chaudhary, P. and V.P. Tewari (2008) 'Tourism Recreational Value of Rock Garden Chandigarh, India', e-Review of Tourism Research, Vol. 6, No. 2, pp. 36-44

Choe, K., D. Whittington and D.T. Lauria (1996) 'The Economic Benefits of Surface Water Quality Improvements in Developing Countries: A Case Study of Davao, Philippines', Land Economics, Vol. 72, No. 4, pp. 519-527

Farber, S. (1988) 'The Value of Coastal Wetlands for Recreation: An Application of Travel Cost and Contingent Valuation Methodologies', Journal of Environmental Management, Vol. 26, pp. 299-312

Freeman, A. M. (1993) 'The Measurement of Environmental and Resource Values: Theory and

Methods', Resources for the Future, Washington DC

Guha, I and S. Ghosh (2009) 'A Glimpse of the Tiger: How Much are Indians Willing to Pay for It?' Working Paper, South Asian Network for Development and Environmental Economics (SANDEE), No. 39-09

Hanley, N., J.F. Shogren and B. White (2007) 'Environmental Economics', Macmillan

Jabarin, A.S and S.A. Damhoureyeh (2006) 'Estimating the Recreational Benefits of Dibeen National Park in Jordan using Contingent Valuation and Travel Cost Methods', Pakistan Journal of Biological Sciences, Vol. 9, No. 12, pp. 2198-2206

Kadekodi, G.K. (2004) 'Environmental Economics in Practice (Case Studies from India)' Oxford University Press, New Delhi

Khan, H. (2004) 'Demand for Eco-tourism: Estimating Recreational Benefits from the Margalla Hills National Park in Northern Pakistan', Working Paper, SANDEE, No. 5-04

Kolstad, C.D. (2003) 'Environmental Economics', Oxford University Press, New York

Marawila, T.D. and M. Thibbotuwawa (2010)'To Develop or to Conserve? The Case of the Diyawanna Oya Wetlands in Sri Lanka', Working Paper, SANDEE, No. 52-10

McConnell, K. (1992) 'On-site time in the demand for recreation', American Journal of Agricultural Economics, Vol. 74, No. 4, pp. 918-927

Navrud, S and E.D. Mungatana (1994) 'Environmental Valuation in Developing Countries: The Recreational Viewing of Wildlife', Ecological Economics, Vol. 11, November, pp. 135-151

Rockel, M.L. and M.J. Kealy (1991) 'The Value of Non-consumptive Wildlife Recreation in the United States', Land Economics, Vol. 67, No. 4, pp. 422-434

Rosenthal, D.H. (1987) 'The Necessity for Substitute Prices in Recreation Demand Analyses', American Journal of Agricultural Economics, Vol. 69, No. 4, pp. 828-837

Sohngen, B., F. Lichtkoppler and M. Bielen (1998) 'The Value of Day Trips to Lake Erie Beaches' Working paper, Ohio State University

Tietenberg, T. 'Environmental and Natural Resource Economics', Pearson Education

Tobias, D and R. Mendelsohn (1991) 'Valuing Ecotourism in a Tropical Rain-Forest Reserve', Ambio, Vol. 20, No. 2, pp. 91-93

Ward, F. and Beal, D. (2000) 'Valuing Nature with Travel Cost Models: A Manua'l, Edward Elgar, Cheltenham

Whitten, S. and Bennett, J. (2002) 'A travel cost study of duck hunting in the Upper South East of South Australia', Australian Geographer, Vol. 33, No. 2, pp. 207-221

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