Recreational Demand for Tuskegee National Forest: A Non-Market Valuation

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ABSTRACT

The demand for outdoor recreational activities has been increasing in the United States and is a significant part of the lifestyle in the South over the last few years. Forest recreational opportunities are available on public-owned forests, and some provide amenities such as, drinking water, electricity, flush toilets, and sewer at each campsite. Some charge a form of service fee. Tuskegee National Forest (TNF) is the smallest of four of Alabama's national forests that serves visitors from the surrounding counties but does not provide amenities. However, the public demand has not been assessed. The purpose of this study was to use non market valuation methods to estimate the visitors' demand and willingness to pay for such amenities, if they were to be provided as well as to assess the different recreational activities in TNF. Visitors' data were collected and regression analysis was employed to estimate the recreational demand. The result suggests that there is a demand for the TNF. The visitors who come from distance are more willing to pay entrance fee than the visitors from closer proximity.

INTRODUCTION

The demand for outdoor recreational activities has been increasing in the U.S. and has become a significant part of the Southern lifestyle over the last few years. Over 191 million acres of public lands are used for recreational activities in the US. It was projected that participation in recreational activities in the South would increase from 18 percent in 1995 to 96 percent by 2050 (Bowker et al., 1999a; Cordell and Tarrant, 2002).

The range of available recreational opportunities in the South varies and includes large tracts of underdeveloped land and highly developed parks located in urban areas. Forest recreational opportunities are available on public-owned forests managed by government agencies at federal, state and local levels, and private forest owned by corporations or by individuals (Cordell and Tarrant, 2002). A few forest-based recreational activities generate direct income for landowners in the form of entrance fees, hunting leases, and other fees for shooting practice. Users of such recreational activities in the South are accustomed of paying nothing for the scenery and pay little for recreational activities like camping. The lack of payment shows the undervalued forest based recreational services. Environmentalists and economists believe that the nation's forests are not valued properly in economic terms. Valuation problems exist for non-timber services that forests provide, such as recreation which lead to inefficient resource management (Kramer et al., 1992).

Alabama has four National Forests: Bankhead, Conecuh, Talladega and Tuskegee. About 26 percent of the estimated recreational visits to these forests are on developed sites and the remaining 74 percent of recreational visits are to undeveloped sites, generally dispersed recreational sites designated as wilderness (National Forests in Alabama, 2003). Except for the Tuskegee National Forest (TNF), the other three national forests provide amenities such as sanitary facilities, drinking water, electricity, flush toilets, and sewer at each campsite (National Forest in Alabama, 2003). The TNF is located in the East-central region of the state of Alabama. It is the smallest of four Alabama's national forests as well as the smallest in the nation, with an area of 11,000 acres. It serves visitors from Birmingham, Huntsville, Montgomery, Tuscaloosa, and Columbus, Georgia (National Forests in Alabama, 2003).

Economic valuation problems exist for many of the non-timber services provided by the National Forests and forest in general. The lack of economic evaluation that indicates the benefit to society can lead to the mismanagement and destruction of resources (Kramer et al., 1992). The non-timber products include recreational activities such as camping, hiking, hunting, horseback riding, aesthetics, and bird watching. Hibbert (1994) showed that, although timber use is the dominant commodity of all forest resources, the demand for recreational services provided by forests has increased significantly. Bowker et al. (1999b) assessed public opinion regarding the implementation of user fees in general to fully or partially fund ten broad categories of recreational services and found that over 95 percent of the respondents supported either user fees or a combination of user fees and taxes to fund at least one recreational service on public lands. Resource development and management of such recreational

services can guide and help consumers' to benefit from the activities (Walsh, 1986; Macie and Hermansen, 2002). The introduction of entrance or user fees would show the value for the service provided by the national forest and could generate revenue for the provision of amenities in undeveloped national forests. TNF is an example of a national forest in Alabama without amenities for visitors and for which the public demand and the willingness to pay for amenities have not been assessed. The purpose of this study was to develop a valuation method for the services provided by TNF. Hence the research assessed the different recreational activities in TNF, identified the users, and estimated the demand for recreation services and visitors' willingness to pay for amenities, if they were to be provided.

EMPIRICAL STUDIES

Nearly three in ten Americans said they participated in outdoor recreation and that National Parks were the most visited recreational sites (Recreation Roundtable, 1999). Recreational participant's preferred specific recreational activities for different reasons: personal taste, effects of past experience, social and cultural conditions, cost and time available, and information available on alternative options (Cordell et al., 1999). U.S. Department of Interior (2001) showed that about 37.8 million U.S residents participated in fishing, hunting, and other wildlife-related recreation. Total expenditures by the participants were approximately estimated at $108 billion. Such expenditures for food, lodging, transportation, and equipment had an important impact on the local economies.

The economic valuation of environmental or public goods can be determined through the analysis of the public's willingness to pay (WTP) for the use of the services or the public's willingness to accept a reduction in such services. The travel cost method (TCM) and contingent valuation (CVM) are two widely used approaches to estimate the value of non-market goods. TCM uses direct expenditures by visitors, an approximation of the value of the natural resource. Contingent Valuation (CV) is an alternative methodology consisting of surveying people about how much they would be willing to pay to preserve (or create) a recreational service. The WTP is a measure of economic benefits expressed in terms of their dollar value. The basic assumption is that the sovereign consumer knows what is best for his or her welfare and can express those preferences through willingness to pay (Hanley and Spash, 1993). According to Cummings et al. (1986) the amount of money resource users are willing to pay for marginal increases in consumption should approximate the monetary value they are willing to accept for a marginal decrease in consumption.

The TCM has been used in a wide range of studies to estimate economic value and to measure demand for various natural amenities, using consumption behavior in related markets. Consumption costs include travel cost, entry fee, on site expenditures and outlays on capital equipment needed for consumption and based on observed market behavior of users and is, therefore, the preferred method for assessing outdoor recreation (Loomis and Walsh, 1997; Walsh, 1986). Maxwell (1994) used the TCM to determine the value of goods or commodities by analyzing the direct costs incurred by visiting the site, including, the time spent traveling to and from the site and the time spent there.

Travel time as an opportunity cost of work or leisure activities forgone for travel to the recreation area is also used in the TCM (Bhat et al., 1996; Walsh, 1986; Loomis and Walsh, 1997). In the estimation of travel cost functions Ortacesme et al. (2001) and Bhat et al. (1996) used the number of visits made by individuals as the dependent variable while individual travel costs and socio-economic variables such as age, education and household income were independent variables. Hackett (2000) and Chen et al. (2004) estimated the recreational benefits of a beach, using the number of trips taken as a function of direct travel expenditures, and a dummy variable for travel from the origin, and education. Snowmobiling was the largest winter recreational activity in Wyoming. Coupal et al. (2001) used the TCM to estimate the individual economic benefits associated with snowmobiling in order to gain an understanding of snowmobilers' characteristics, preferences and motivations, and to compare the elicited values for the recreational activity. Data on trip cost, trip behavior, number of visits and demographics were collected through surveys. Travel costs were estimated by calculating mileage cost, maintenance cost and other wear and tear for a two-wheel drive sport utility vehicle, and the respondents' opportunity cost in terms of time.

Adamowicz et al. (1994), Loomis and Walsh (1997) and Park et al. (2000) combined the travel cost and contingent behavior methods to value the aesthetic benefits from environmental goods. Visitors were asked about their total trip cost, and if they were willing to pay user fees, entrance fees or taxes for forest recreational services and other natural resources. A trip demand function was used to evaluate the economic value of existing recreational

resources and the willingness to pay to preserve them in the current state. The results identified the maximum additional expenses visitors were willing to pay before canceling their site visit.

Visitor's characteristics can influence study results. Hibbert (1994) for the study on Talladega National Forest in Alabama, emphasized visitors' characteristics such as numbers, socio-demographics, geographic dispersion, tastes and preferences for recreation. Three different groups of users were identified – professional users, local users and regional users. Marketing strategies for the Talladega National Forest were developed. Some of the significant marketing strategies identified included opportunities for hiking, backpacking and similar activities. Such outdoor activities provided incentives for out-of -town visitors to stay longer in the forest and provided recreational activities that met the tastes and preferences of current forest users. The conclusion was that the Talladega National Forest could increase its standing in the region and bring needed dollars to the neighboring communities it borders by providing benefits that visitors sought.

MODEL DEVELOPMENT

Recreational demand is based on the microeconomic theory of consumer behavior or the WTP for a good (Walsh and Loomis, 1997; Cummings et al., 1986). The consumer choice or willingness to pay for goods and services is primarily influenced by the level of income and socio-demographic factors such as age, occupation, education, and gender. Such factors are also influenced by the distance to the recreational site. These factors determine the consumer's willingness to pay for and the benefits enjoyed from recreational activities (Walsh, 1986). We used the TCM and CVM to estimate the trip demand function, willingness to pay an entrance fee to get basic amenities and the consumer surplus.

The trip demand function can be expressed as:

$$V = f(TTC, S) \tag{1}$$

The contingent model:

$$WTP = y(S, V) \tag{2}$$

where V is the number of visits made by an individual to the site; TTC is the total travel cost, S represents visitor's socio-economic characteristics, and WTP is the dollar amount visitors are willing to pay as entrance fee.

Data Collection

The study used primary data. A survey questionnaire was designed and pre-tested before it was administered. The survey questionnaire consisted of two parts. Part one contained the questions about the activities they were engaged in such as picnicking, hunting, camping, hiking, walking, cycling, bird watching and horse back riding. In the survey, respondents were also asked to provide information about miles traveled, other travel expenses incurred and the number of visits to the forest. The questionnaire included some questions about stated preference, intention to return to the site in the future, and how much visitors to the park would be willing to pay for an entrance fee if basic services were provided. Part two of the questionnaire included questions about respondents' personal information – age, gender, education, income and occupation. The list of visitors from 2001 to 2002 was obtained from TNF Rangers Office visitors' registration. Only 143 visitors who had provided complete name and address were selected. The questionnaires were mailed out to the selected visitors with self-addressed, stamped envelopes. Second mailing and telephone reminder was done for non-respondents during August to October 2004. Sixty two visitors completed and returned the questionnaires, a 43 percent response rate.

Empirical Model

The total travel cost (TTC) reflects the distance from origin to TNF. The TTC for this study consisted of the round trip miles traveled to the TNF and vehicle operation costs per mile (U.S. Department of Energy, 2003) incurred by the respondents. The round trip cost is miles traveled divided by the average miles per gallon multiplied by the price of gasoline per gallon (using 2003 prices). Trip demand equation:

$$VT = \beta_0 + \beta_1 ttc + \beta_2 age + \beta_3 edu + \varepsilon \tag{3}$$

where VT is number of visits by the respondents, ttc is the total trip cost, age is age of the respondents, education is education level, and ε is the error term.

$$WTP = \beta_0 + \beta_1 age + \beta_2 edu + \beta_4 VT + \beta_5 Dum + \varepsilon \tag{4}$$

where WTP represents entrance fee in dollars, age is age of the respondents, education is education level, VT is number of visits, Dum is a dummy variable 1 if the respondent intends to visit in the future or zero otherwise, and ε is the error term.

The information on the number of visits was available from the survey. However, the questionnaire was not designed to obtain response about the number of future planned visits but only stated future intentions. The response to the question was developed as a dummy variable used to investigate whether future intentions influenced the willingness to pay an entrance fee. Based on past studies it is hypothesized that the predicted sign of the coefficient for the total travel cost is negative. The higher the total travel costs the lower the number of visits. However, the older the visitor and the higher the visitor's level of education, the higher the willingness to pay (Ortacesme et al., 2001). Appendix 1 provides the description of variables in the regression.

RESULTS AND DISCUSSION

The socio-demographic characteristics analyzed for this study were age, gender, and education. The majority, 80 percent of the visitors were men. Table 1 shows the summary statistics of the variables and variables used in the models.

Table 1. Summary statistics of variables in the model

Variable	Mean	Std. dev	Minimum	Maximum
Age	35	12.64	15	66
Education	2.34	0.91	1	4
TTC	55.96	35.16	15.28	151
Visits	8.44	4.73	1	20
WTP	3.91	2.25	0	6

The mean age of the respondents was 35 years and mean education was some kind college level training. The mean total travel cost was $56 with a large standard deviation an indication of wide dispersion, which also reflects that visitors come both from closer proximity and farther distance.

The respondents were also asked a question about travel distance from the place of origin to TNF. The average one-way trip traveled was about 45 miles. The visitors originated from six major locations in-state and out-of state. The major users of the forest in Alabama originated from Auburn, Montgomery, Opelika, and Phenix City which are cities in close proximity to TNF. About 49 percent of the visitors were from these four neighboring cities: 18 percent from Auburn, 15 percent from Opelika, 11 percent from Montgomery, and 5 percent from Phenix City. The rest 51 percent of the visitors were the rest of Alabama, 41 percent, and 10 percent from out of state.

Since TNF does not provide basic amenities such as running water, bathrooms, pavilion and cabins for visitors. Respondents were asked if they were willing to pay an entrance fee if such services were provided. Respondents were given a range of $4.00 to $6.00 as an entrance fee to be imposed if basic services were to be provided. The majority (63 percent) was willing to pay entrance fee between $5.00 - $6.00 and 15 percent $4.00, while about 22% were not willing to pay entrance fees. The range was selected from information gathered on entrance fees in both private and public parks in Alabama. Subsequently, respondents were asked whether they have intention to visit the National Park in the future. The resulted indicated that about 75 percent of the visitors expressed their intention of future visit to the National Forest. Table 3 presents Pearson correlation, a positive and significant correlation between WTP and miles traveled (5% significance level) while there is a negative and significant correlation between WTP and number of visits (1% significance level). The further the distance the higher the willingness to entrance fee and the frequent the visit the lower the willingness to pay entrance fee. Miles traveled and number visits have a negative and significant correlation (5% significance) implying that the farther the distance the less the number of visits. Visitors coming from far would be willing to pay extra money to get amenities to make their travel worth.

Table 3. Pearson correlation between willingness to pay entrance fee (WTP), miles traveled and number of visits

Variable	WTP	Miles	Visits
WTP	1.000	0.2823 (0.0573)	-0.3316 (0.0243)
Miles		1.000	-0.2887 (0.0516)
Visits			1.000

Figure in parenthesis are p-values.

Table 4 provides a two-table of respondents' education levels and the kind of recreational activity they engage in. About 27 percent of the respondents had completed 12 years of formal education, including GED. Thirty five percent of the respondents had some college or vocational/technical training and 38 percent had bachelor's degree, and masters' degree or doctorate. This indicates that a majority of people who visit TNF have some college

degree and above. The respondents were engaged in 112 recreational activities. The major activities were camping, hunting, and hiking accounting for 38 percent, 23 percent and 21 percent, respectively. The remaining is accounted for other recreational activities, shooting range 9 percent, picnic 5%, and bird watching. The table shows that the majority of the respondents had some kind of college education and degree holders and mainly engaged in camping, hunting and hiking.

Table 4. Recreational activity by the different education level of respondents

Activity	Education			Total	Percent
	GED	Some College	Masters/Doctorate Bachelor's Degree		
Camping	11	13	18	42	38
Hunting	7	11	8	26	23
Hiking	5	9	9	23	21
Shooting Range	3	2	5	10	9
Picnic	2	2	2	6	5
Bird Watching	2	2	1	5	4
Total	30	39	43	112	100
Percent	27	35	38	100	

Regression Results

SAS was used to estimate equations 3 and 4. The data set was tested for heteroskedasticity using Goldfeld and Quandt test (Maddalla, 2000). The lower F-ratio value suggested that of heteroskedasticity was not a problem. Table 5 presents OLS regression results of the two models. In the TCM model education and total travel cost appears to influence the recreational demand for TNF while age is not closely linked to number of visits. The coefficient for education is positive and significant implying the visitors with higher education, an indicator of income, frequently visit TNF. Total travel cost was negative and statistically significant, confirming the downward sloping demand curve: assuming that travel cost is considered the price of services in a perfectly competitive market. The higher the total travel cost, the lower the number of visits. This finding is consistent with results from previous studies that used TCM in which total travel cost was significant and negatively associated with the number of visits (Ortacesme, Ozkan and Karaguzel, 2001; Hackett, 2000). A trip demand function by Maxwell (1994) showed that number of visits was negatively and significantly associated with total travel, while education was positively related to total travel cost.

Marginal effect representing the effect of change in the number of visits for a one unit change in a given factor are calculated as the mean number of visits multiplied by the estimated coefficient of the factor. The coefficient for total travel cost is negative and statistically significant, confirming a downward- sloping demand curve. The elasticity of demand is -0.29. Estimated demand elasticity for visits is important to provide information to assess shifts in visitation patterns and fees and user permits are imposed. The non-market economic user value, consumer surplus per visit, was evaluated from the estimated travel cost model. The average round trip miles traveled by the visitors was 90 miles. The consumer's surplus for TNF was estimated to be $232 per person per trip. This is based on the estimated average number of visits, 8.44, and an average total travel cost per trip of $55.

Table 5. Regression results for TCM and CVM

Variables	TCM	CVM
Intercept	8.2308*	6.5320*
	(2.3358)	(0.9343)
Age	-0.0286	0.0467*
	(0.0523)	(0.0185)
Edu.	1.3670*	-1.1693*
	(0.6679)	(0.2580)
TTC	-0.0366*	
	(0.0181)	
Visit		-0.6164*
		(0.1443)
Dum		0.4731*
		(0.1219)
Adj.R^2	0.41	0.50
F- Statistics	5.35*	10.82*
Number of Observations	62	62

*** significant at 1 percent level, figures in parenthesis are standard errors**

The importance of the variables in the model differs with the estimation model used. Age is not significant in the TCM but has positive and significant effect in the CVM implying that the matured and most probably visitors who have developed the habit will be willing to pay extra money for amenities. Education has a significant negative impact on willingness to pay entrance fee in the CVM while the TCM indicates that education level has a significant positive effect on the number of visits. This implies that recreationist, who are educated may make more visits but the CVM confirms that willingness to pay more for the visit declines as education increases. This could be that when visitors are confronted with increased access cost they may shift to another site (Park, et al., 2002; Bowker and Leeworthy, 2002). These are essential to evaluate program impact associated with visits to TNF.

The coefficient for number of visits (VT) is negative and significant, confirming the hypothesis that, people who make frequent visits, and who live within close proximity, might not be interested in amenities. There is a negative correlation between number of visits and miles traveled indicating that recreationist for closer proximity will visit frequently and also have a choice to go to Chewacala state park located about 10 miles away and has amenities.

Critical issue in the management and provision of TNF is to examine how marginal valuation of willingness to pay entrance fee from the CVM model depend on the recreationist's current and prospective trips. CVM assess how willingness to pay entrance fee varies with recreationist who plan to visit in the future. The respondents were asked whether they were intending to visit in the future or not and about 75% of the visitors expressed their intention to visit in the future. The dummy which shows the future intentions to visit TNF is positive and significant. This suggests that those who are intending to visit in the future will be willing to pay entrance fee. However, assuming a competitive market the entrance fee to be charged has to be competitive to avoid losing visitors to cheaper sites.

These variables give insight to the recreation managers and local business to predict the expenditure patterns. Targeting marketing and advertising campaigns towards outlets that are viewed by more matured visitors with higher education may have the highest payoff in generating high levels of expenditure from visitors.

CONCLUSION

The study used a non-market valuation method for TNF and showed that there is demand for the recreational services provided by TNF and visitors are willing to pay entrance fee for amenities. TNF is used by people from the state and out of state. About 90 percent of the visitors are for Alabama and the remaining 10 percent is out of state. About 49 percent of these visitors are from neighboring cities of Auburn, Opelika, Phenix City and Montgomery. Except Montgomery which about 30 miles distance from TNF the rest of the cities within 20 miles distance and these cities are residential areas for university faculty/staff and students of the surrounding colleges and universities. There are also some frequent users from the rest the state A significant proportion (51 percent) are coming from the rest of Alabama and out of state.

Recreational activities provided by TNF consist of: bird watching, camping, hiking, hunting, picnic and shooting range. The main recreational activity by the visitors is camping, hunting and hiking with picnic and bird watching being the least. The TNF does not provide amenities such as sanitary facilities, drinking water, electricity, flush toilets, and sewer at each campsite to visitors. One important finding is that the demand for the amenities might be low and variable. The result of the survey indicated that many of the visitors who make frequent visits and who live within close proximity may not be interested in the amenities. One possible explanation would be that TNF competes with a state park about 10 miles away with all the amenities. Furthermore those visitors coming from far and who intend to return were more willing to pay for amenities than those who do not intend to visit in the future. Visitors were willing to pay an average entrance fee of $4.60 per visit. It is plausible to say that the TNF Rangers Office have to accommodate two groups of visitors, visitors who want to use the forest with and without amenities. The visitors from close by will keep on using without the amenities but the visitors from distance will pay to get the services. Charging a competitive entrance fee, especially the fee charged by the neighboring state and national parks could maintain the current users and attract new ones. The results are limited by the assumptions made and data used however the model showed that undeveloped national forests could provide amenities and can generate revenue to supply and maintain the quality of amenities. Further investigation through the use of an annual survey will provide the necessary data to continuously monitor the use of the available recreational services for decision making and implementation.

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