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Value and Demand Determinants for Recreational Area: The Case of Ajora Water Fall, Boloso Bombe Woreda, Wolaita Zone, Southern Nations Nationalities and Peoples' Regional State, Ethiopia

Yisehak Ossa Jokka
College of Business and Economics, Wolaita Sodo University, Wolaita Sodo, Ethiopia

Abstract
Environmental and natural resources such as parks, water fall and forests give many services to human beings. Recreation is an activity that increases visitors' satisfaction. However, the absence of market for these resources hides theie benefits. The objective of the study was to estimate the economic value of Ajora recreational area which is found in Southern Nations, Nationalities and Peoples Regional State in Boloso Bombe Woreda of Wolaita Zone. This study used the Individual Travel Cost Method (ITCM) to estimate the economic value of recreational area. Data was collected from 130 randomly selected sample visitors in the recreational area. Truncated Poisson model were employed for data analysis using SPSS V16 softwares. The regression result indicated that travel costs, visitors' income, age, level of education and other substitute sites were major determinants of visits to the site. The result of this study also showed that the potential annual use value of the recreational area was estimated to be 2,006340 ETB which is higher than the revenue currently collected from visitors to the site. We therefore recommend for the park management to be revisited in view of the estimated economic value and the significant determinants this study identified.
Keywords: Ajora, Recreation, Travel, Truncated, Valuation

1. INTRODUCTION

Environmental and natural resources such as parks, water fall and forests give many advantages to human beings. Such as material and experiential benefits that contribute directly to human well-being mostly for tourism and recreation. Much effort has been made to estimate the economic values of the world's environmental goods and services given by natural capital. So, it is important to quantify these benefits in understandable terms. However, the absence of market for these resources in developing countries negatively affects the well-being of human beings by reducing the benefits that can be generated from these resources (Costanza et al., 2000) .Recreation is a human activity which increases visitor's utility when he or she sees environmental good and services.

Recreational values are a particular type of non-consumptive direct use value. Money value of recreational service is thought as an important and desired tool in resource management. In order to measure the economic value of environmental goods and services economists developed several techniques that help to value the service and goods gained from the ecosystem (McConnell &Walls, 2005).A number of approaches have been used to value the benefits obtained from visitors to environmental resources and other recreational sites such as forests, parks and heritage site. In order to estimate recreational benefit in a case of public resources, travel cost method (TCM) is most commonly used method.

According to Gurluk and Rehbar (2008), suggested that the failure to determine the value of the resources existing at a particular recreational site had lead to an underestimation of the true value of the resources. This in turn, may prompt the decision makers to use the site for other development activities that may result in the damage quality of resources in the site. Finally the resources in the site decreasing from time to time due to lack of proper management. Ecosystem services in many parts of the developing country have deteriorated in large part, because of the loss of habitat from an ever-expanding population (Poor and Smith, 2004).

The administrative bodies of the site and other peoples around the area do not have awareness about the recreational values of the site and environmental values of Ajora water fall recreation area. As result they were not also able to make informed decision about the potential use and ecological benefit of the site, because of lack of scientific data to get its values. Consequently, the quality of the site may deteriorate over time, which could force visitors of the site to shift to other substitute sites. This condition may, over time, result in an irreversible damage to the different environmental resources on the site as well as to business. Hence, this study was obliged to estimate the recreational use value of services at the site and estimated annual recreational use value that can generate from visitors in the site.

2. Objectives of the Study

2.1. General Objective

The general objective of the study was to estimate use value of Ajora water fall recreational area**.**

2.2. Specific Objectives of the Study

- To identify the determinants of visit to the Ajora water fall recreation site.
- To estimate the recreational value of the site and demand function for the recreation site.

3. Methodology

3.1 Study Area Description

Ajora water fall recreation area is one of the known recreational sites in Wolaita Zone, Boloso Bombe Woreda in Southern Nations Nationalities and Peoples Region (SNNPR). It is located 345KM from Addis Ababa and it is found 8^0 3' North 26^0 25' East. The Ajora water fall recreational area is about 360 hectares which has covered by various environmental and natural resources which are important for socio-economic development for surrounding community.

Figure 1: Geographical location of the study area

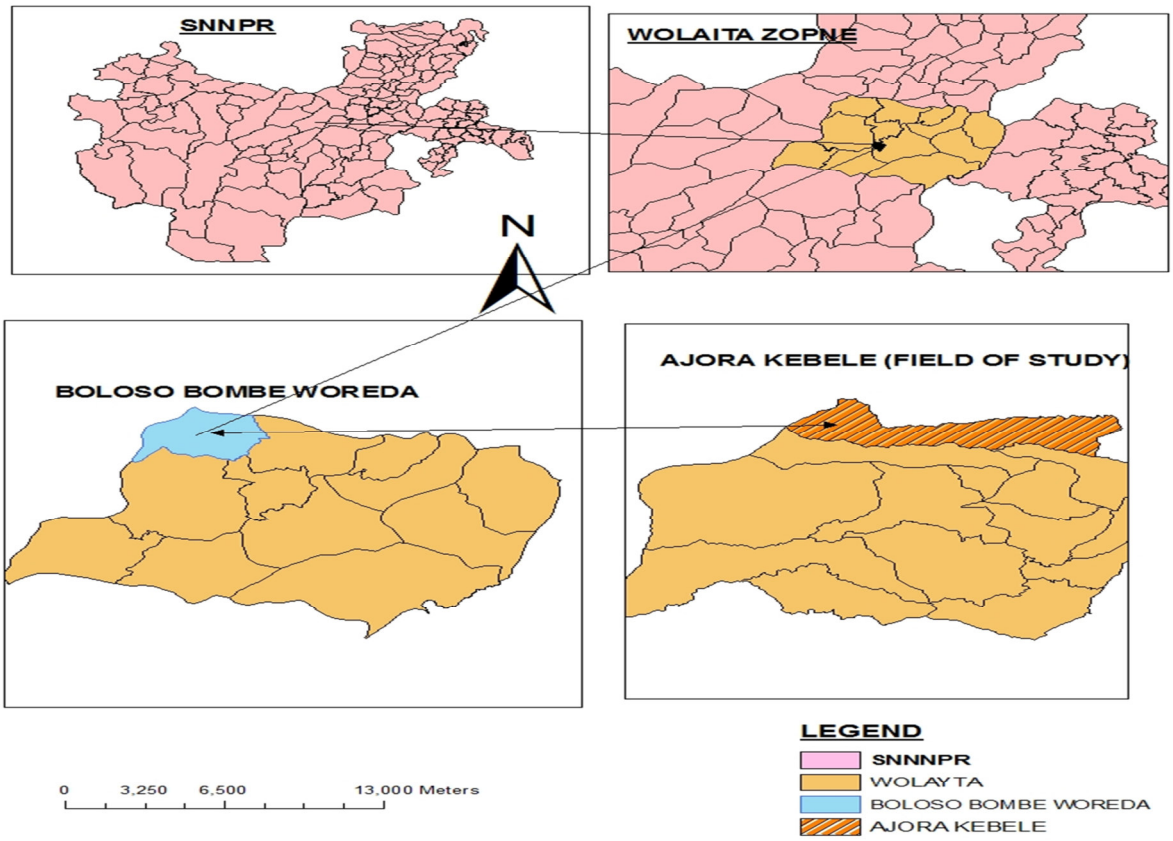

Figure 1: Geographical location of the study area
Source: Boloso Sore Woreda Agricultural Office (2013)

3.2. Sources and Methods Data Collection

The sources of data were both primary and secondary. The primary data was collected through face-to-face interviews of the recreationists on the site using structured questionnaire. Secondary data were collected from regular and statistical reports of documented sources visitors' information in the site

3.3 Sampling Method

According to Gujarat (2004), rule of thumb formula which is N≥8m + 50 where, N is the sample size from total population and M is explanatory variables. Those variables were Sex, education status of visitors', income of visitors', age, travel cost of visitors', visitors' mode of transport, marital status of visitors,' visitors' number in group, occupation and substitute recreational sites. These 130 sampled visitors were proportionally clustered by 64 weekdays and 66 weekend visitors based on the information obtained from previous year annual visitors' flows report to the Ajora recreation site. Then, each group was randomly selected and interviewed on-site using structured questionnaire.

3.4. Methods of Data Analysis

Both descriptive and econometrics methods of data analysis were employed. Descriptive analysis was used to explain identify the determinants of visit to recreational site arrive at conclusion of the study. In econometrics methods of data analysis the truncated model I was used to estimate the recreational value of the site and demand function for the recreation site.

3.4.1. Econometrics Analysis: The Truncated Model.

The truncated model for the recreation demand function is adopted from Greene (2003), as follows:

$Vij = \beta Xi + \in i$, equation..... (1)

Assuming Vij/ Xi ~ N (μ, 2) and μ = Xi

Where: Vij = Individual i's visit to site j

Xi = Vector of explanatory variables for individuals.

β = Parameters

$\in i$= Error terms

In this truncated model, we observe Vij only if Vij≥ 1.

Now, taking the density function of Vij (truncated variable) with probability density function of f(Vij), mean μ = βXi and standard error.

$f(Vij/Vij \geq 1) = \frac{f(Vij}{prob(Vij \geq 1)} = [(\frac{1/\delta)\varphi[(Vij - \beta xi/\sigma}{1-\emptyset)\ \alpha i})]$ equation----------(2)

Where:φ(.) = Standard normal probability distribution function

∅(.) = Standard normal cumulative distribution function

Hence $E(Vij/Vij \geq 1 = \frac{\beta Xi + \sigma\varphi[1 - \beta xi]/\sigma}{1 - \emptyset[1 - \beta xi]/\sigma}$- equation ----------(3)

$Var((Vij/Vij \geq 1) = \sigma 2[(1 - \sigma(\alpha i)]$ ---------- (4)

Clearly, the conditional mean and variance are non-linear functions. Thus, ML estimation is preferred to OLS due to the fact that in a truncated model, the partial derivative of equation (15) with respect to Xi is equal to β[1-δ)α i] which is different from β . In the estimation of the truncated model maximum likelihood (ML) estimation was used rather than classical linear regression model because of the dependent variable was truncated at zero, this means only those who actually visiting the recreation site included in the sample from total population. Because the data for the dependent variable is integers, truncated below one visit per year, equation estimation by OLS regression is such data is inappropriate. According to the (Maddala, 1992), showed that the estimated regression line by OLS will be biased estimate of true slope when the dependent variable is truncated. The result is that the least squares method understates price elasticity and overstates consumers' surplus. Price elasticity is defined as (in this case) the percentage change in quantity demanded (trips) caused by a one percent change in money trip price (travel cost).

The regression results were obtained in this study, therefore; estimated using maximum likelihood (ML) estimators. Since Poisson and negative binomial regression functional forms are equivalent to logarithmic transformation of the dependent variable. Truncated Poisson or truncated negative binomial regression is appropriate for dependent variables with count data (integer). However, the significance of coefficients in a Poisson regression can be greatly overstated if the variance of the dependent variable is not equal to its mean, i.e., there could be over-dispersion problem with Poisson regression (Greene, 2000)

An alternative approach test also suggested by Cameron and Trivedi (1990), in Greene (2000) is the negative binomial regression model. The negative binomial regression model was not used in this study after the tests for over dispersion but, truncated poison model was used after the test of over dispersion problem. These tests showed that over dispersion was not the problem of this data. Thus, truncated Poisson regression model was adopted. Thus, truncated Poisson model was used to represent a simple count data model.

As explained Parsons (2003), the Poisson regression model specifies that each Vi (number of trip) is drawn from a Poisson distribution with parameter,λ which is related to the repressors Xi. The initial equation of the model is:

$prob(Vi = vj) = \frac{\exp(-\lambda)\lambda i^{v}}{vi}$, equation----------(5)

Where: V = 0, 1, 2, 3…; and λ is the expected number of trips = E(V), which is taken as equal to the variance of the random variable = Var(V).

$L = \frac{\pi_{i=1}^{N} \exp(-\lambda)\lambda i^{vi}}{Vi}$, equation----------6

An individual is denoted by i = 1…, n, so vi is the number of trips taken by person i. In estimation, the parameters βi, on which λ depends according to equation (5) are chosen to maximum L.

Consumer surplus, or access value, for each person in the sample has an explicit form in the Poisson model.

For individual i the surplus is

$Cs = /\frac{1}{-\beta i}/$ equation ----------(7)

Where: λi is the expected number of trips from equation (5). Once the parameters of the model are estimated, equation (7) is used to calculate the surplus value for each individual in the sample and then aggregated over the population of users to arrive at a total access value.

Prob (Vi/ Vj) >0 $\frac{\exp(-\lambda)\,\lambda i^{v-1}}{Vi-1}$ equation----------(8)

4. Results and discussion

4.1 Determinants of visit to the Ajora water fall recreation site.

As shown from the maximum likelihood estimates of the truncated Poisson regression model below table 1 revealed that travel cost (TC), visitors income(Y), Substitute recreation site (SS), education (E) and age (A) were important factors influencing the recreation trips to the area. The socio-economic and demographic factors are affecting the demand for visits to a recreation site in travel cost method study such as households' income, travel-cost, age, education and other substitute sites. An increase in the travel cost by one birr will decrease the number of visits made to the Ajora recreational site approximately by 0.038. This m earns that people living closer to the Ajora recreational site made many trips while those living far from the site made fewer trips. The result was found in study is agree with Andualem and Wogene(2011), in similar area of study which states that as travel cost increases the demand for recreation decreases.

An income of the visitors increases by one birr then the numbers of visits are expected to increase by 0.0004 %. The result was found in study is consistent with the Jeong and Haab (2004) in similar area of study. When age increases they are more likely to be engaged in social activities and they are less likely to make visits to recreation site and according to the result, it has negative effect and statistically significant at 5% level of significance on demand on visit in recreation area. The positive coefficient sign of this variable suggests that more educated people who were (college and university and above) visit the Ajora recreation site more frequently than less educated one (elementary and high school) and statistically significant at 5% level of significance This result is disagreeing with or inconsistent with other similar study conducted by (Sitotaw 2011; Terefe, 2000). They found that education has a negative and significant impact on the demand on particular recreational activity and its sign what was expected.

Table 1. **: A maximum Likelihood Estimation of the Truncated Poisson Regression**

Explanatory Variable	Expected sign	Truncated Poisson coefficients	P-value	Marginal effect	Mean values
Travel cost	_	-.01903 (.0008329)	0.002***	0.038	414.4384615
Marital status	+	.2729645 (.2203028)	0.215	0.546	1.538461538
Sex	+	.1321482 (.2295456)	0.565	0.264	0.723076923
Education	+	.3556356 (.1728385)	0.040**	0.711	2.25384615
Income	+	.0002008 (.0000647)	0.003***	0.0004	3481.892308
Occupation	+	.168152 (.1470152	0.253	0.336	1.5923076
Age	_	-.0423271 (.0205008)	0.039**	0.084	32.66153846
Number of group	+	.0258552 (.2383798)	0.914	0.052	0.661538462
Substitute site	_	-.3005784 (.2751452)	0.012**	0.060	0.446153846
Mode of transport	+	.051416 (.1735002)	0.767	0.102	2.284615385
constant		1.4820518 (1.112307)	0.000	2.964	N/A

ML Result	
Sample size =130	(LR)chi2(10) =74.48
Truncated regression	Prob> chi2 = 0.0000
Log likelihood(LR) = | -106.60198|	Pseudo R2 = 0.2589

Source: Own survey result (2014)

** & *** represent statistical significance at 5% and 10%, respectively

4.2 Recreational benefit estimation and Demand function

The basic assumption of Travel cost method is that people reflect their willingness to pay for a site by the amount of money and time they spent in traveling to the site. Thus, total number of annual visits (V) and travel costs per trip (TC) are the two crucial elements used to construct the demand function for recreational area. The exponential function was selected in this study as the benefit estimates from the power function are not defined because the data was in logarithmic terms. The linear semi log travel cost model hypothesis is:

$LnVij = \beta 0 - \beta 1\ TC + \varepsilon i$, equation ----------(9)

Where:

Vij = individual i's annual visits to Ajora recreation site.

TCi = individual i's travel cost measured in ETB.

$\beta 0$ = the sum of the values of all other significant variables (assuming all the other variables are at their mean values) and the constant term in the original model.

$\beta 1$= The coefficient of travel cost

εi = residual assumed to be normally distributed with mean = 0, and variance = $\delta 2$

The estimated demand function for Ajora recreation site is can be expressed as:

Ln Vij =1.482 -0. 019035TCi, equation----------(10).

By considering sample visitors only, the annual recreational value of Ajora recreation site was estimated by calculating the area under the demand curve. To estimate the recreational value of the site the average numbers of visitors of the used .This was done transforming equation (10) into an exponential function and integrating the inverse demand function between 0 and average number of visits 1.66, this was used to estimate the area between the travel price and average visit. This was estimated at Birr 29,224 for the average number of visits. To get recreational value of the site per visit, divide the average recreational benefit of the site to sampled 130 visitors. The recreational value of the site per visit per person so was, therefore, estimated Birr 224.8.

Now, considering the annual sales record of Ajora recreation site, the total number of visits to the site for the last 12-months period at the survey was 8925.

Then, the estimated individual recreational value per visit per person can be translated into total annual recreational value use as follows: Birr 224.8 x 8925 = Birr 2,006340. Therefore, the total annual recreational value of the site was estimated to be Birr 2,006340**.** The result was found in study is inconsistent with the Wogene (2011) who found that the annual recreational benefit of Gudumale recreation area was estimated to 8,383,604.5ETB and individual recreational benefit per visit per person birr 589.15 .

Using the exponential demand function, consumer surplus (CS) for the average number of visits is calculated as the area below the demand curve and above the average travel cost. Thus, individual consumer surplus (CS) per visit was approximated dividing one to travel cost coefficients (equation 10). Which was estimated to Birr 52.53?

This consumer surplus per visit can be translated into aggregate consumer surplus for the total number of 8925 visits for the last 12-months period, multiplied by individual consumer surplus .Which was approximated to Birr 468,830.25.

5. CONCLUSIONS AND RECOMMENDATIONS

5.1. Conclusions

The results of this study indicate that most of recreation areas national parks, waterfall and other natural resources were not properly valued with appropriate and well-defined scientific approaches in developing countries particularly in Ethiopia. The quality of these resources is therefore decreasing from time to time due to lack of proper management of resources. Poor resource management occurs, among other things, due to absence of estimated value of resources.

The regression results obtained from this study showed that travel costs, visitor's income, level of education, age and substitute recreation sites were important determinants of the recreation demand of the site. The coefficient of travel cost is negative and significant implying that an increase in travel cost reduces the number of visits of the site.

Similarly the coefficient of income variable was positive and significant. This implies that the demand for recreation increases as visitors' income increases and vice-versa. The relationship between education variable and recreation demand was positive and significant implying that the more educated people make more frequent visit than less educated ones.

The expected total annual benefit of the site was, therefore, estimated at Birr 2,006340**.** Use of a travel cost model to estimate the willingness of users to pay for visits to Ajora recreation sites has demonstrated that these sites provide substantial values to users. Based on the survey result of this study and secondary visitors data indicated that the estimated benefit get visitors from the site is larger than the actual annual income revenue that the site authority earned from visitors of the site.

5.2. Recommendations.

Based on these results of the study, it is therefore legitimate to draw the following recommendations.

- The amount of revenue that the site authorities collected from the services far from the true economic recreational benefit of the site. Consequently, the site authorities and other concerned bodies need to be awareness towards conservation benefit and economic value of the site.
- The site authorities should expand the recreational area facility of services to extract some of the extra consumer surplus enjoyed by visitors.

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