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Determinants of Recreational Demand of Abijata-Shalla Lakes National Park in Ethiopia: A Travel Cost Approach

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Abstract*: One of Ethiopia's national parks, Abijata-Shalla Lakes is renowned for its tourist attractions as well as its conservation of biological variety, including birds. Large numbers of tourists from domestic and various countries visiting the park as a result of its tourism amenities. However, the park is seriously threatened by locals' competition for subsistence farming. Policy-makers and local planners require recreation visit demand and based on its number of visits and determinants of the park visitor's information in order to distribute the park resource effectively in the absence of a perfect market. With the use of data gathered from 99 visitor samples in the park, a structural questionnaire, and an analysis of count data from a Poisson econometric model, this article set out to estimate the demand for recreational visits and its drivers. According to the data, there were 1.7 visits per individual on average per year. The average consumer surplus per tourist was determined to be $ USD 3,107.00. The recreational value of all on-site visitors was calculated to be $ USD 40.4 million in 2021. The park's estimated net current non-market recreational demand over the next 20 years was $ USD 0.6 billion. Regression analysis results indicated that monthly income, experience, and attitude toward the site were positively impacted whereas visitor travel costs, family size, and the existence of replacement sites were negatively impacted. Therefore, while developing park recreation policy, the recognized elements that have an impact on the Park should be taken into account. Additionally, the park's annual income was only 3% the value of the services used by visitors. As a result, it is feasible to boost the park's earnings even further. It's crucial to improve park conservation efforts in order to achieve the desired tourism and conservation goals.*

Keywords: ***Recreational demand; Travel cost method; Poisson regression; Ethiopia***

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INTRODUCTION

Background of the study

At the 1992 Earth Summit, the governments of different countries in the world agreed agenda for sustainable development of Convention on Biological Diversity (CBD), inter alia, calls on governments to establish systems of national parks model to manage, support of conservation and recognize national parks as economic institutions. This approach has a key role to play in the alleviation of poverty and the maintenance of the global community's critical life-support systems that further requires awareness and understanding of its economic values of national parks (IUCN, 1998).

According to a substantial body of literature, the money made from tourism in African national parks compromises more than just a tiny amount of the economic worth of the parks themselves. For a number of reasons, it is crucial to be aware of the true costs associated with these services, which are primarily recreational (Fausold, and Lilieholm, 1999).

National parks are increasingly being used for recreational purpose worldwide nowadays. When used for ecotourism, national parks present both an opportunity and a difficulty. The chance is to make money by providing tourists to ecotourism with a beautiful perspective of national park resources that will satisfy

visitors. Maintaining the national park's balance aspects, such as its natural resources, scenic beauty, historical objects, and wildlife, is challenging. Due of strong local communities' pressure and large national park visitors, the issue gets problematic. As a result, a management strategy for the national park would combine the potential and the problem by generating income from the usage of the resources by assessing admission or user fees (Nuva and Mad, 2009).

Generally speaking, markets do not determine who gets to visit public national parks for enjoyment. Instead, admission is free or costs a little entrance charge that has no connection to the cost of giving access, and there is little to no fluctuation in these access prices over time or between locations to offer information for econometric evaluation of demand functions (Nillesen, 2002).

Ethiopia has established a significant number of national parks to protect its biodiversity and draw tourists from across the world. Currently, there are about 80 protected areas (PAs), 45 of which are national parks. These PAs cover 17% of the country's land are home to about 860 bird species (16 of which are endemic and nearly two of which are genera), 279 mammal species (35 of which are endemic and six of which are genera), 201 species of reptiles (14 of which are endemic), 23 species of amphibians (23 of which are endemic), and 150 species of fish (6 endemic). These protected places are deteriorating over time. Land is being transformed for commercial and subsistence farming, the use of timber for building and construction, and the grazing of cattle on grasslands. The conventional assumption of the economic recreational worth of the parks, which is based on admission fees and undervalues the parks' overall economic value and their recreational value in particular, is one of the factors contributing to the loss of forests and other protected property (James, 2010).

Abijata Shalla Lakes National Park was created was to protect the incredible variety of unique and common birds. More than 76 animal fauna species have also been identified in the park (Fekadu and Rezenom, 2002). High-end tourist attractions in the park include hot springs, picturesque lake views, and a variety of topographical features (Deffar, 1998). The park was suggested by the United Nations, Education, Science, Cultural, and Organization to be a world heritage site, (Birdlife International, 2010).

In spite of its valuable ecological and recreational services, there is unsustainable use of the park resource by the local people and the park is under high threat of local people for anthropogenic activities. Many households and their cattle are currently residing in the park. The forest is being cut for building and charcoal production, the grassland is being overgrazed by cattle, and the park land, which is a wildlife habitat, is being utilized for subsistence farming. The situation is made worse by the lack of efficient law enforcement.

Standard economic theory predicts that under a perfect competitive market resources are allocated efficiently. The invisible hand theory operates. Under this condition government policy interventations is unjustified. However, in the case of environmental resources and public goods such as national parks, perfect competition is violated, the market system fails to allocate the resource efficiently and the government interventations is justified with the assumption that the government acts with the best interest of the people and policies adopted are therefore expected to reflect people interest.

According to Clawson and Knetsch (1966), resource management benefit in several ways. Firstly, it would give a way to contrast the significance of leisure with other uses of the same resources. Secondly, an indicator of whether it would be desirable to make the required investment in the project would be the demand for the recreation that would be given by a planned recreation location. Thirdly, any fees that would be imposed for its usage would have a cap according to the demand for the leisure.

Therefore, It is necessary to impute demand and use value that reflect the true social costs and benefits of recreational activities in the park using the fundamental non-market environmental resource valuation revealed preference technique Individual Travel Cost Method in order to measure the recreation services in monetary terms, which is important in the economic costs and benefit analysis of allocating outdoor recreation sites (ITCM). Identification of the park's recreational demand drivers is essential, as is quantifying their significance, in order to increase the park's recreational potential from the viewpoint of the visitors. This study's was overarching goal to analyze the demand for recreational activities and pinpoint the factors that influence Abijata-Shalla Lakes National Park.

2. RESEARCH METHODOLOGY

2.1. Location of the study site

Abijata - Shalla Lakes National Park (ASLNP) is located in Ethiopia, about 220 km south of Addis Ababa, the capital city of the country. It is found in East Arsi Zone of Oromia National Regional State. it is geographically, found in Ethiopian Central Rift Valley at 7^0 30' E 38^0 30' N, elevations ranging from 1540 to 2075 m.a.s.l. The park is bordered by three Woredas (Districts) *i.e*. Arsi Negelle, Adami Tulu Jido Kombolcha and Shalla. It covers the total area of 887 square kilo meter out of which 405 square kilo meter is dry land and majority of its area (482 square kilo meters) is under Abijata, shalla and Chitu lakes (Mohammed, 1998).

The park was established predominantly for the conservation of large number of bird species; as a bird sanctuary in 1971 (EWNHS, 1996). It is part of ECRV

Wetlands within the Somali-Masai biome wetland system. The wetlands of ASLNP, is found associated with Abijata and Shalla. These wetlands have been considered as important site for socioeconomic activity by the residents and the conservationists classes look them as an important site for biodiversity.

In addition to the lakes, numerous hot springs and associated rivers are found in and around the park. Two rivers; Bulbula and Horakelo are both flowing into Lake Abijata from Lake Ziway and Lake Langano respectively. Jido and Dedeba Rivers are also providing inflow to Lake Shalla (Tenalem, 2001).

The soil of the study area is often fragile, alluvial and very fine in nature, and is very susceptible to both wind and water erosion (Tolcha, 2005). It is maintained by the acacia-euphorbia woodland around. The soil of the areas is not fertile for agriculture. The climate the site is favorable for both visitors and residents with average annual temperature is 20.1^0C, with a mean maximum of 26.6^0C and mean minimum of 13.5^0 C (EWNHS, 1996). Rainfall months are March, April, June, and September with annual averaging 500 mm (CPI, 2000).

The study site is mainly covered by endogenous acacia woodland. In addition, euphorbia woodland, riverine vegetation, bush land, shrub and herbaceous species (including grasslands) are the vegetation types in the study area. The dominant acacia tree species are: *Acacia tortilis*, *Acacia Senegal*, *Acacia seyal*, and *Acacia gerrardii*.

The Park is known by the presence of unique and endemic avifauna and are important tourist sites especially for Flamingos and Pelicans feeding in the lakes. According to some estimates, the park provides temporary or permanent home to over 530 bird species, which amounts to more than half the number recorded for the whole country including endemic once.

It is because of its geographical position that the park provides wintering and maintenance station for such a large number of terrestrial and aquatic birds, which include Southern African, Sub-Saharan and Palaearctic species (Dagnachew *et al*., 2005), The neighboring island of Lake Shalla is one of the few nesting sites of Pelicans found in Africa. Apparently, the number of these birds is decreasing because of decreasing the fish at Lake Abijata affected by Soda Ash factory, which is situated at northern side of the shore. The polluted lake water is causing loss of algae on which fish feeds. As a result, the Pelicans that feed on the fish migrated. The area is an important habitat for mammal wildlife which makes it a potential area for tourism and major conservation area of biodiversity. Mammal species in the area include Grants Gazelle, Jackals, Oribi, Warthog, and others. But the majority of the mammal species have been reduced or eliminated because of habitat disturbance and severe competition with livestock for forage (UNESCO, 2004).

2.2. Data Sources, Sample Size and Sampling

According to the information obtained from Ethiopia Wildlife Conservation Authority (EWCA), during the past five consecutive years (2014/7-2021) on average 5,213 local visitors and 510 non local visitors, totally 10,223 visitors visited the park per annum. Therefore, average user population of the park is 10223 per annum. Based on this annual user population, 90 percent confidence level and 10 percent desired level of precision; the sample size of the study was determined as;

$$n = \frac{N}{1 + N(e^2)} = \frac{10223}{1 + (10223 * 0.1^2)} = 99$$

..... (6)

Where: n= Sample size; N= Average park visitor population size per annum ; e=10% level of precision; and 10% level of precision ensures representative from the selected population, because generally accepted level of precision for representative samples was 10 or less percent (Fink, 2003). Based on the equation 6, sample size of the study was determined to be 99 individual visitors. Using proportion, the number of local and non local sample visitors was determined to be 58 and 41, respectively.

2.3. Methods of Data Collection

In this study, data was collected from visitors at Abijata Shala Lake national park visitors. The park is visited all season round the year with November to February being the January peak season. Data for this study was collected from November to February, 2021. The process of data collection was done by 3 enumerators and one supervisor using structural questionnaire.

2.4. Method of Data Analysis

In this study, descriptive statistics were used to elaborate socio-economic characteristics of sampled visitors. Mean, percentage, range, frequency, standard deviation, chi-square and T-test were used to describe individual behavior and socioeconomic factors affecting recreation use of ASLNPPoisson regression econometric model

The basic count data model that satisfies discrete probability distribution and non-negative integers is Poisson regression, and the number of trips taken by a person to a site in a given season (V_{ij}) is assumed to be generated by a Poisson process (Creel and Loomis, 1990). Following Haab and McConnel (2002) and

Parsons and Needelman, (1992) the basic count data model can be written as,

Pr (V_{ij} = n) = f (X_i β), n = 0, 1, 2

Where V_{ij} = demand variable is an element of the set of non-negative integers. The probability of observing an individual takes n trips in a season (probability density function) can be given by

$$\Pr(v_{ij}=n) = \frac{e^{-\lambda_i}\lambda^n}{v_n!} \qquad V_i = 0, 1, 2 \quad \ldots\ldots\ldots\ldots (7)$$

Where:

λ_i is both the mean and the variance of the distribution of the expected number of trips and assumed to be a function of the matrix of the explanatory variables X_i and parameter β_i and takes strictly positive value. In recreation demand analysis, since it is necessary that $\lambda_i > 0$, it is specified as an exponential function,

$$\lambda_i = \exp(X_i\beta_i) \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (8)$$

$$E(Y|X_i) = \text{var}(Y|X_i) = \lambda \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (9)$$

Where: E(Y/X) = expected number of trip given explanatory variables.

Var(Y/X) = variance of number of trips given explanatory variables.

To ensure non-negative probabilities, λ usually takes a log linear form and hence, Poisson form of the recreation demand for individual can be written as,

$$\text{Ln}(\lambda) = \beta_{TC}\, TC + \sum \beta_i X_i \qquad (10)$$

Where: TC= travel cost

Equation 10 shows the probability of observing the number of trips taken by an individual and the parameters can be estimated by maximum likelihood estimates. Then Poisson likelihood function for the sample in terms of parameter β takes the form of,

$$L(B/x) = \prod_{i=1}^{T} \frac{\exp(-\lambda_n \lambda_n^{Vn})}{V_n} \quad V_i = 0, 1, 2...n, \ \ldots\ldots(11)$$

Equation 11 gives the actual pattern of the visits which is the product of the individual probabilities where individuals are denoted by i=1…T.

On-site random sampling was adopted in the study, and when corrected for truncation at one trip and over sampling frequent users (endogenous stratification) the probability equation takes the form,

$$\Pr(v_n / v_n > 0) = \frac{\exp(-\lambda_n)\lambda_n^{V_n-1}}{(v_n-1)!} \quad \ldots\ldots\ldots\ldots\ldots (12)$$

For recreational trip data, the variance is often greater than the mean, implying over dispersion of data. Poisson models may underestimate standard errors leading too frequently to the rejection of null hypothesis of no association; hence a more general model to account for over dispersed counts based on negative binomial probability distribution can be applied. According to Creel and Loomis (1990) the function will take the form of,

$$pr(V_n / V_n > o) = \frac{\Gamma(V+1/\alpha)}{\Gamma(V+1)\Gamma(1/\alpha)}(\alpha\lambda_i)^V (1+\alpha\lambda)^{-1(V+1/\alpha)}$$

…….. (13)

Where, Γ (.) indicates the gamma function, a discrete probability function defined for V_i with parameters λ and α being strictly positive. When over dispersion, truncation and endogenous stratification accounted for, the conditional negative binomial density function will take the form of,

$$pr(V_n / V_n > o) = \frac{\Gamma(V+1/\alpha)}{\Gamma(V+1)\Gamma(1/\alpha)}(\alpha\lambda_i)^V (1+\alpha\lambda)^{-1(V+1/\alpha)}\left[\frac{1}{1-(1+\alpha\lambda)^{(-1/\alpha)}}\right]$$

…… (14)

Mean of the random variable V = E (V) = λ and variance = λ+ αλ2 and when α→0, the gamma distribution converges to zero.

Following Parsons and Needleman (1994) for individual n, the Expected Consumer Surplus (ECS) or access value per person per visit can be written as:

$$(ECS) = \frac{1}{\beta_{TC}} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (15)$$

Where, λ is expected number of trips from equation12, the estimated access value for an individual sample average n number of visit for the period can be expressed as

$$CS_V = \frac{\lambda_n}{\beta_{TC}} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (16)$$

Where: λ_n = average number of visit a person is taking per period, in this case the last 12 months. Total annual consumer surplus value or net willingness to pay for individual can be aggregated over the population of users to obtain the total access value and can be depicted as,

$$CS_N = ECS * N \quad \ldots\ldots\ldots\ldots\ldots\ldots (17)$$

Where:

CS_N= Aggregated total demand per annum

N = Total number visits

After annual total demand was estimated, future total economical recreational demand is estimated using annual total recreational value and using Social discount rate and geometric progression (Sohngen *et al., 1999*).

$$TNPV = \frac{CS_N}{(1+r\%)} + \frac{CS_N}{(1+r\%)^2} + \frac{CS_N}{(1+r\%)^n} \ldots = \frac{CS_N}{r\%}$$

…….. (18)

Where:

TNPV= Total net present demand

CS_N= Aggregated Surplus per year

R% = Social discount rate
n = Number of years
Different analysts faced with a variety of functional forms under which the trip generates function can be specified (typically linear, quadratic, semi-log and log-log (Smith, 1988).
The terms “semi-log” and “double-log” derive from the transformation by which the corresponding exponential functions can be linearized via logarithmic transformation. In this thesis, semi log was used because of its explaining power pseudo $R^{2,}$ significance level and negative sign of travel cost.

$$LnV_{ij} = \beta_0 + \beta_1 SV + \beta_2 TTC + \beta_3 AGE + \beta_4 AT + \beta_5 EDUL + \beta_6 FZ + \beta_7 GEN + \beta_8 HD + \beta_9 MR + \beta_{10} MOT + \beta_{11} VOC + \beta_{12} PY + \beta_{13} SS + \beta_{14} TDR + \beta_{15} TGS + \beta_{16} OST + \beta_{17} Y + VE_{18} + \varepsilon_I \quad \text{.....(19)}$$

Where:
$Ln(V_{ij}) =$ The expected number of trips (in logarithm) which is the dependent variable
SV= Source of individual visitors (1= local, 0= non local)
TTC = Total travel cost of individual visitor’s in $ USD or US$ during this visit
AGE = Age of individual visitor’s in years
AT= Attitude of individual visitors toward the ASLNP in ordinal scale (1-5)
EDUL= highest education level achieved by individual visitor’s in years of study (1-22)
FZ = Number of individual visitor’s family size
GEN = visitor’s gender as dummy variable. (1= male; 0 = female)
HD = Individual visitor’s responsibility in the family in dummy (1= head; 0= otherwise)
MR= Individual visitor’s marital status as dummy variable (1 = married; 0= otherwise)
MOT = Visitors' mode of transport as dummy variable (1= for own car; 0 = otherwise)
VOC = Individual visitor’s occupation as dummy variable. (1= government employee; 0 = otherwise)
SS= Existence of ASLNP substituting recreation for each individual visitor’s as dummy variable (1= yes; 0= no)
TDR= the sum of elder and younger dependence in the individual visitor’s family in ratio
TGS = Number individual’s with individual sample visitor’s group during visiting ASLNP
OST= Individual visitor’s time spent time in hour in hours at ASLNP
Y = individual visitor’s family monthly income after tax
PY= Percent of individual visitors family income allocated for ecotourism site recreation
Purpose
VE= Individual visitor’s ASLNP visiting experience in years
ε_i = the error term and;

$\beta_{1,..}\beta_{18}$ are regression coefficients which measure the changes in the number of visits as a result of a unit change in the explanatory variable, other things remaining constant.

3. RESULTS AND DISCUSSION

3.1. Descriptive Analytical Results

Table 1: Summary statistics of variables used in recreational demand analysis

Variables	Mean	Standard Deviation	Minimum	Maximum
Number of Visit	1.79	1.033	1	4
Attitude (Number 1-5)	3.53	1.327	3	5
Travel Cost ($ USD)	27,922.53	3323.98	1000	112250
Visitors age (Years)	53.39	14.1	27	75
Visiting experience (Years)	3.75	5.8	0	25
Monthly income ($ USD)	25,730	23,846	1,400	93,750
Family Size (Number)	3.60	1.6	1	8
Education levels (years of study)	16.95	2.99	8	22
Percent income allocation	11.51	3.57	6	20
Group size (Number)	6.02	5.822	1	26

Source: Survey Results, 2021

4.2. Poisson Regression Result

As can be observed from summary Table 2, travel cost and visitors' disposable income variables standard deviation shows violation of normality assumption. To correct this problem, the two variables travel cost and disposable income raw data were log transformed before running the regression. As noted earlier, the recreation demand function is approximated using the number of visits to the site as dependent variable and the travel costs associated with the trip and other socio-economic characteristics as independent variables. Single site ITCM and count data model was used to estimate the existing benefit of the site under ordinary demand system using Marshallian consumer surplus for the i^{th} individual. Before that the data set was tested for multicolnearity problem using VIF with statistical software STATA version 11.2. Based on analysis result, on average VIF value was found to be 1.78 which is less than 10 or R^2 is 0.57 which is less than 0.90.

In the case of likelihood test, the unrestricted log likelihood is –350.1943 and the restricted log likelihood is –582.4674. Thus, LR is equal to 232.2731. However, at 1% significance level, the table (critical) value of the test with h=18 degrees of freedom (χ^2 , 18) is 23.542. Since the computed value is greater than the critical (tabled) value, we can reject the null hypothesis which says all independent variables are irrelevant at 1% significance level. Thus, the model used in this study is significant at 1% significance level.

Goodness-of-fit is interpreted as closeness of fitted values to sample value of the dependent variable. This can be measure using the pseudo-R^2 that is an extension of the R^2 to the linear regression model. A higher value is usually preferred. One possible way of calculation is given by:

$$\text{Pseudo } R^2 = 1 - \frac{\ln L_{fit}}{\ln L_o} = 1 - \frac{-582.9348}{-350.1943} = 0.6646$$

Pseudo R^2 can also be used for other regression models in the exponential family, such as Poisson, geometric, binomial, exponential and gamma for which R^2 measures do not generally appear to be available. For models with canonical link function, it can additionally be interpreted as the fraction of uncertainty explained by the fitted model (Cameron and Trivedi, 1998).

3.2.1. Abijata Shalla National Park Visitors' annual demand analysis

The regression results presented in Table 3, estimate the parameters of the demand function using a regression of the dependent variable number of visits to site ASLNP (V_{ij}) on explanatory variables using Poisson regression. The pseudo R^2 of the model is 0.6646 indicating a good fit of the model. It explains that about 66.46 percent of variations in the dependent variable are explained by the variations of the explanatory variables in the model. The constant has a positive sign indicates that the demand for visits to ASLNP is just a normal good.

As can be seen from Poisson regression result Table 19, as expected there is an inverse relationship

between number of visit and cost of visiting to the park, other variables held constant. This means demand by individual visitor for recreation trips is negatively sloped, showing that if the money cost of a recreation trip (round trip from home to site and back to home) rises, recreationists will take fewer trips per year. This downward sloping demand curve is consistent with theoretical literature as argued by Pearce and Turner (1990).

The goal of the travel cost based recreation demand analysis is to empirically measure the annual net monetary value of satisfaction received or recreationists' willingness-to-pay in excess of the costs of the recreation trips consumer surplus is summed for the recreationists used and divided by their average number of trips per year.

The task in the measurement of welfare is finding consumer surplus. Consumer surplus is a widely accepted measure of net social benefit. It represents the difference between an individual's willingness to pay and actual expenditure for a good and service. With count data models, the procedure most often used is to calculate per trip consumer surplus (Creel and Loomis 1990). Per trip measure can be multiplied by the estimated number of trips in a year to obtain the aggregate consumer surplus of access to a given site or sites, in general or for a Specific activity. The method establishes a relationship between the costs (the price) incurred by travelers to a site and the number of trips taken. This relationship is further exploited to

Table 1: Poisson regression analysis result

Variables	Coefficient	Standard error	P>z (95%)
Constant	4.579842	3.079728	0.137
Age of Visitors	-0.0120471	0.0097526	0.217
Amount of stay	-0.0204057	0.0400372	0.61
Attitude	0.3741988	0.1423153	0.009***
Educational level	-0.0082617	0.0470281	0.861
Family size	-0.23486	0.12603	0.062**
Group size	-0.0036734	0.0259875	0.888
Head of Family	-0.3117584	0.3921078	0.427
Marital status	0.334652	0.3176661	0.292
Mode of Transport	-0.1367427	0.2944265	0.642
Percent allocation disposable income	0.003756	0.0402277	0.926
Gender	-0.1494407	0.3098688	0.63
Substitute site	-0.06939	0.04428	0.032**
Total travel cost	-0.0003218	0.0000318	0.000***
Total dependence ratio	-0.251306	0.2317861	0.278
Source of visitors	1.47105	0.7979903	0.265
Visiting experience	0.0226556	0.0095268	0.02**
Visiting occupation	0.5903461	0.4406656	0.18
Monthly disposable income	0.201404	0.1187596	0.09*

Source: Survey Result, 2021 ***, ** and * significant at 1%, 5% and10% respectively

LR chi2 (18) = 97.34
Prob > chi2 = 0.0000
Log likelihood = -582.1942
Pseudo R^2 = 0.6646

derive Marshallian Consumer Surplus (CS) for access to the park for recreation experiences, by integrating the area under the demand recreation curve and above average travel cost.

Based on the Poisson regression model, dependant variable number of visit observed mean was equal expected (predicted) mean. In this study, the mean number of annual trip per person was found to be 1.79. Based on the analysis result, a visitor per visit demand which is consumer surplus was found to be $ USD 3,107.52. Therefore, since on average a visitor visits the park 1.79 times per annum, a visitor's average demand was calculated to be $ USD 5,562.46.

This result is similar to Sitotaw (2003) described in section 2 empirical literature of this thesis. EWCA of 2012/13 fiscal (budget) year report shows that the total number of visits to ASLNP in the last 12 months is 13,000 visits. Therefore, aggregate annual on site recreational consumer surplus is obtained by multiplying the per trip consumer surplus of the visitors for the total number of 13000 visits for the last 12 months, which is approximated to $ USD 72.3 million. This figure is by far greater than revenue collected by the park authority which is $ USD 3 million from entrance fee which is $ USD 10 and $ USD 90 for local and non local visitors respectively.

Current estimated annual aggregated recreation use value of the site can extrapolated into future and discounted back to present values to estimated future recreational value of the Park which is important to achieve park resource dynamic efficiency allocation. One of the objectives of EWCA is to conserve protected areas wildlife and their habitats for the well-being of the current and future generation. To estimate total future discounted recreational demand, there are assumption that current values of consumer surplus will continue in perpetuity, so that the present value of such a continuous flow of annual value can be found by discounting the flow to a present value with appropriate social discounting. According to African Financial Organization (2012), Ethiopia's real interest rate was 3%. Using currently estimated annual recreational demand value of the park $ USD 40.4 million is discounted as Net Present Value (NPV) as indicated Table 3.

Table 3: Discounted recreational demand scenario

Years	Discounted Value ($ USD millions)
1-5	185.02
6-10	159.6
11-15	137.67
16-20	118.78
1-20	601.05

Source: Own Computation, 2021

From Table 2, it can be observed that net present value of the park was estimated discounted to be about $ USD 0.6 billion in 20 year's period. This discounted net present recreational demand value or discounted welfare estimated value is specifically helpful for park managers and policy makers to be aware how much visitors' value the recreation service visitors get from the park in the form of utility or welfare and help them allocate the resource efficiently among competing uses of the park land.

3.2.2. Factors that determine recreational demand of the park

Number of people visiting a recreation site (V_{ij}) is affected by number factors such as visit configuration factors, socioeconomic and demographic characteristics and attitude of individual visitor's behavior and their relation to the recreation site. The econometric model enables us to identify important variables among them. The sign, magnitude and level of significance of the estimated parameters of the determinants of number of visit of the visitors are indicated in Table19.

The result shows that seven parameters of the model are statistically significant at P< 1%. The independent variable, travel cost has a negative co-efficient of 0.0003218. This illustrates that the negative relationship between trip costs and number of visits. This is consistent with theory which stipulates that when the price of travel increases then the number of visits will decrease. This negative relationship is responsible for the negative slope of the demand curve implying that the demand for visits to the site is a normal good. This finding

is consistent with the empirical works of most researchers such as Garrod and Willis (1992) in the valuation of a forest carried out in the UK.

According to the law of demand, the price of a good influences the demand for a commodity, thus travel costs act as a proxy of price which influences the number of visits to the site. The negative sign is expected because as the costs of travel to the site increase, one is expected to take fewer trips per annum, ceteris paribus (given a fixed level of income). An increase in the travel cost by one $ USD will decrease the number of visits made to the site approximately by 0.03%. This means that people living closer to the site made many trips while those living far from the site made fewer trips.

Visitors' monthly income affects the number of visits positively. This seems reasonable, because when the income of an individual increases, then the individual might be willing to substitute wage for leisure. On the other hand it is natural that people are willing to pay more for normal goods when their income increases. As described in Table 19, the coefficient for income is significant at 10% significant level. As the income of the visitors' increases by 1% then the number of visits is expected to increase by 20%. As visitors income increases to higher level people also prefer clean and attractive environment during their time of visits. But as it illustrated in the descriptive section, visitors claim to improve the park status, all visitors expressed that the park should be protected from agricultural expansion and other land use forms. For reasons outlined above, monthly income of visitors is an important variable but has a very small effect on the decision to make more or fewer trips.

Similarly, substitute site as was the expected was negative in sign and significant at 5% significant level. This confirms theory that existence of substitute sites depresses the demand for the good in question. The coefficient of this dummy variable shows, the extent to which the behavior of the category taking values of deviate from the base value of zero. According to Permian and McGillivray (1996), another way in which goods might be related for them is to have similar uses, that is, they can be substituted for one another. Substitutes sites are related in a way that an increase in consumption of one site, holding consumer satisfaction level and quantity consumed constant, decreases the marginal rate of substitution of the other site. If the entry fee of a substitute site increases or there is deterioration in quality of the site, visitors will turn away from the now relatively higher priced and poor quality site. The negative coefficient of substitute sites indicates that the existence of substitute sites is associated with less frequent visits to the particular site. The existence of substitute sites reduces the visitation rates by 6.9 percent. This indicates that the variable substitute affects the number of visits from two directions. The negative coefficient of substitute site is consistent with the empirical works of Kaliampakos and Damigos (1999).

From the regression result, the variable attitude (AT) is found to be positive and significant at p< 1%. From Table 2, it can be seen that when the attitude increase by 1 percent, the probability of visitors' visiting rate increase by 37%. This means coefficient of history attitude variable is positive and significant explaining that the more attractive the park significance when making a trip decision. It also measures access characteristic or easiness to access to the park. The coefficients of the access characteristic in regressions imply that the more attractive the access aspect is, the more times visitors would visit the park.

The number of family members has a significant negative coefficient at p < 10%. As can be seen from Table 19, when a visitor's family size increases by an individual, the probability visiting ASLNP decrease by 3.5%. This may be due to spillover effect on visitor's income, *i.e*., visitors out of pocket money that could be allotted for recreation purpose relatively decreases as family size rises which in turn negatively affects the number of visits that a visitor could take. Therefore, visitor's family size is expected to have a negative relationship with the number of visits.

From the regression result it is also found that natural resource site experience has positive and significance at p< 5% . As indicated in Table 19, when visiting experience increased by one year, the probability of an individual visiting the site increases by 2.2%.

In general from the regression result the following variables were found to be determinants of ASLNP recreation demand. Visitors' travel cost, visitors' family size, and existence of substitute site were found to affect negatively and would likely shift the recreation demand of the park to ward left. In addition, visitors' attitude toward the recreation park, visitor's family disposable income and visitors' ASLNP visiting experience were found to be affected positively and found to shift the recreational site demand to ward right direction.

4. **SUMMARY AND CONCLUSIONS**

4.1. **Summary**

The objectives of this study were to estimate annual and total future recreation demand of ASLNP in monetary and to identify determinants of recreational visit using one of non market goods and serves valuation techniques reveled preference method. Out of the reveled preference method, ITCM was selected.

The result showed that predicted and observed number of visit is equal to is 1.79 per year per visitor. Accordingly, per person per visit consumer surplus was found to be $ USD 3,107.52, per person per year consumer surplus was fond to be $ USD 5,562.46. This consumer surplus per visit can be translated into aggregate consumer surplus for the total number of

13,000 visits for the 12 month period of 2012 before the survey, which was approximated to be $ USD 40.49 million. The park authority is collecting annually $ USD 3 million which is only about 7.4% of the visitors' net willingness to pay. This implies that the amount of revenue that the site authority is collecting from the service can be increased.

The net present non-market recreational demand of ASLNP is $ USD 0.6 billion. Visitors' travel cost, visitors' family size, and existence of substitute site were found to affect negatively and would likely shift the recreation demand of the park to ward left. In addition, visitors' attitude toward the recreation park, visitor's family disposable income and visitors' ASLNP visiting experience were found to be affecting positively and found to shift the recreational site demand to ward right direction.

5.2. Policy Implications

Policy implications are very important not just for ASLNP managers, policy makers, conservationists' stakeholders, donors, planners, and for communities in different ways for the sustainable management of tourism to protected areas in Ethiopia. Based on the study result, the following policy implications are implied which can help the future intervention strategies amid at improving recreational demand of the ASLNP in particular and Ethiopian protected areas in general as follow:

The study showed that visitor's access value of the park is worthy. However, the park is under severe threat from local people and need of immediate and effective protection. To avoid the loss, people living in the park with their livestock should be resettled in to another alternative location based on the cost benefit analysis to use the park on sustainable basis.

The park management should further increase the actual revenue collected from the site through entrance, filming, photographing, parking etc. which could again possibly be to reinvested as a fund to strengthen conservation activity, infrastructure and tourism facility development which can again increase the demand of the park.

Visitors' travel cost, visitors' family size, and existence of substitute site were found to affect negatively and would likely shift the recreation demand of the park to ward left. In addition, The Ethiopian wildlife conservation Authority with concerned stakeholders, should devise strategies that minimize visitors' travel cost such as public visitors buses to ward main tourist destination sites, family planning to regulate population growth, improving the quality of the park to make it compete with other substitutes. In addition, access in destination promotion to ward high income group, changing the attitude of peoples toward the quality and biodiversity of the park and promoting the park that once visitors test that site they may like it.

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