VALUATION OF THE BENEFITS OF OUT-DOOR RECREATION USING THE TRAVEL COST METHOD: THE CASE OF WABI-SHEBELE LANGANO RECREATION SITE

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ABSTRACT

Out door recreation is a human activity that increases visitors' utility. The demand for outdoor recreation has been increasing with the increase in population, income and mobility. There is, however, limited natural and financial resource for the provision of outdoor recreation. Thus, there is a need to have a quantitative estimate of economic benefit of outdoor recreation site so as to properly and efficiently allocate scarce resources. It is also important to estimate how much value people attach to the site in order to demonstrate how the Wabi Shebele Langano recreation site managers can extract revenue out of the excess benefit and improve the qualities of the recreation experience and expand the types and varieties of the services.

Individual Travel Cost Method (ITCM) is employed to measure the recreational economic benefits from Wabi Shebele Langano recreaton site. ITCM is preferred to Zonal TCM because almost all visitors of Wabi Shebele Langano recreation area come from one area, i.e. Addis Ababa, though there are some foreigners who come from abroad as well as few visitors who visit the site as they pass-by. In the selection of a model we have taken into account the fact that number of visits, which is the dependent variable, is truncated.

In this study, travel costs, visitors' income, age, level of education, family size, acquaintance with the site, experience on other similar sites and being the head of the family were found to be major determinants of visits to the site.

Using truncated Poisson model, the annual recreational benefit of the site was estimated to be Birr8, 685,774(USD 1,009,974) implying that the site authorities collected 20.87% of this sum.

Therefore, this quantitative valuation may help policy makers make policy-oriented decisions on the area for better planning and management of the environmental resources. ***Furthermore, the study could inspire other researchers to do rigorous research work on the area.***

Key words: Recreational benefit; Travel cost method; Truncated model

CHAPTER 1 INTRODUCTION

1.1. Problem Statement

Environmental valuation is concerned with putting monetary values to natural resources. Recreation sites, as part and parcel of the natural resources, are resource endowments of a country. Unlike other private marketable goods, values of recreation sites cannot easily be determined through the interaction of supply and demand. Thus, there is a need to have some ways to put an economic estimate to recreation sites whose values are not easily determined in conventional market situations.

Recreation is a human activity, which increases visitor's utility. Following a rise in population, income and mobility the demand for outdoor recreation has been increasing in many developing countries (Clawson et. al., 1966). Theoretically, Clawson (1958) explained that putting an accurate and acceptable value on outdoor recreation would be valuable in resource management in different ways. First, it would provide a means for comparing the importance of recreation with that of other uses of the same resources. Secondly, the value of the recreation to be provided by a proposed recreation site would provide one measure of the desirability of making the necessary investment in the project. Thirdly, the value of the recreation would provide a ceiling to any fees that might be charged for its use.

Thus, we need to impute values that reflect the true social costs and benefits of recreational activities using some techniques of valuation of environmental resources. If the economic costs and benefits of outdoor recreation sites are not estimated using accepted environmental valuation techniques, conservation benefits could not be nearly approximated.

Thus, one may be forced to use the area for other development activities due to underestimation of the conservation benefits of the recreation site and overestimation of the benefits of other development activities. As a result, irreversible damage may occur on the natural recreational resources in favor of other developmental activities. Accordingly, there is a need to place a value on outdoor recreation and incorporate its true social costs and benefits.

Apart from this general problem, Wabi-Shebele Langano recreation site is widely used as a natural recreation area for many people in Addis Ababa. It is prominent in its amenity of the natural beach of the 'golden color lake', the pleasantness of the beautiful weather and picturesque landscape and other recreational activities. However, as discussed with the site authorities, they do not make informed decisions to improve the quality of environmental services supplied to their customers due to the fact that they do not have a scientific estimate of environmental benefit of the site. If the site authorities are not aware of the approximate economic value of the site, they are not able to generate revenue vis-à-vis the potential environmental benefit of the site. Accordingly, they cannot improve the quality of environmental services of the site and fall short of

expanding varieties of services that they could supply. Consequently, the quality of the site may deteriorate over time, which could force visitors of the site to shift to other substitute sites. This phenomenon may, over time, result in an irreversible damage to the different environmental resources on the site as well as to the state of business. Hence, there is a need to estimate the value of the site which could help the site authorities be aware of how much revenue they can extract out of the benefit of consumers to improve the qualities of the recreation site and expand the varieties of its potential services.

1.2. Objective of the study

There are many visitors who go to Wabi-Shebele Langano recreation site to enjoy recreational activities. Most of these recreational activities are directly related to the natural beach of the lake, beautiful weather and picturesque landscape. However, there are also other recreational activities available at the site such as sun bathing, boating, outdoor games facilities, barbecue service, etc.

The purpose of this study is to examine and estimate the recreational benefit of Wabi-Shebele Langano recreation site.

More Specifically, the research tries to:

1. identify the determinants of visitations to outdoor recreation in Wabi-Shebele Langano recreation site.
2. estimate a recreation demand function for the site and approximate the environmental

benefit of the site

3. draw some recommendations and policy implications from the results of the study.

1.3. The study site

Wabi-Shebele Langano recreation site is a resort area located 210 kms south of Addis Ababa. The area is bounded by small villages such as Bulbula, Adami-Tulu and Zeway to the north, Arsi-Negele and Shashemene to the south, Asela to the East and Shalla and Abiyata lakes to the west of the site.

Wabi-Shebele Langano recreation site is prominent in its amenity of the natural beach of the golden colour lake, the pleasantness of the beautiful weather and picturesque landscape and other recreational activities. Apart from these natural resources, there is a provision of accommodation, restaurant and snack services.

According to internal sources, Wabi-Shebele Langano recreation site was reserved as a public recreation center starting from 1982 under the supervision of Wabi-Shebele Hotels' enterprise. Before 1982, it was first a privately owned natural area. Then, up until 1982, it used to be a military camp.

Entrance is still free. Nowadays the maximum number of people that come to the site is about 100 during weekdays and about 500 during weekends and holidays.

TABLE 1.1. MONTHLY VISITATIONS TO WABI SHEBELE LANGANO RECREATION SITE (JANUARY 2002 TO FEBRUARY 2003)

Jan.	Feb.	Mar.	April.	May	June	July	August	Sept	Oct	Nov	Dec	Total
2,045	957	702	378	949	668	934	124	1,235	804	758	897	11,551

Source: Annual Sales report at Wabi Shebele Hotels' Enterprise

TABLE 1.2. MONTHLY REVENUE OF WABI SHEBELE LANGANO RECREATION SITE FROM JANUARY 2002 TO FEBRUARY 2003 (IN BIRR, 000)

Jan.	Feb.	Mar.	April.	May	June	July	August	Sept	Oct	Nov	Dec	Total
127.5	171.2	137.5	107.5	145.6	130.8	150.1	183.3	189.9	150.4	165.8	153.6	1,813.3

Source: Annual sales report at Wabi Shebele Hotels' Enterprise

As indicated in table 1.2, the site authorities collected a total revenue of Birr 1,813,309.74 (USD 210,850) from recreationists during the one year period before the survey.

1.4. The significance of the study

Placing an accurate and acceptable value on outdoor recreation would be of great help for proper resource management. Several research works have been done in many countries since the first attempt was made by Clawson and Knetsch in 1961.

Assessment of economic values of different recreation sites is important in several ways:

It would provide a means for comparing the importance of recreation with other alternative economic uses of the same resources. The value of recreation could be compared with other land and water uses. It would provide one measure of the desirability of making the necessary investment in the existing recreation project. It would alleviate the possible occurrence of irreversible damage on the recreation sites.

Despite the importance of imputing value for outdoor recreation sites, very little attempt has been made in Ethiopia to estimate the economic value of out-door recreation sites using acceptable environmental valuation techniques.

This study shows how quantitative estimates can be made of the economic benefit of a recreation site. By doing so the research work attempts to add to the limited empirical literature on the area in Ethiopia.

The results of this study may also help policy makers take policy-oriented decisions for better planning and management. Furthermore, it could also be used as an input for comprehensive and rigorous policy oriented research work on the area of environmental economics.

1.5.The limitation of the study

This research work is subject to time and financial constraints. Therefore, the study is restricted to application of TCM to estimate the economic value of Wabi Shebele

Langano Recreation Site as a case study. Furthermore, a sample is drawn only from visitors of the site. The study also measured only the current recreational benefits of the site which is one part of the total economic value of the site.

1.6.Organization of the paper

The remainder of this thesis is organized as follows. Chapter two highlights a review of literature that consists of both theoretical matters and empirical issues associated with the unifying theme of the study. Chapter three deals with data and methodological issues focusing on survey design, recreation demand variables and expected signs, empirical model and estimation technique. Chapter four discusses the main findings of the study using descriptive and regression analysis. Finally, chapter 5 provides conclusions and policy recommendations drawn from the study.

CHAPTER 2 LITERATURE REVIEW

This section deals with both theoretical and empirical literature with particular emphasis on environmental benefit estimation for outdoor recreation. In the theoretical literature part emphasis will be given on the underlying theoretical framework for the different values of environmental resources and the TCM of valuation of environmental resources. In the empirical literature section recent empirical studies on this area will be reviewed.

2.1. Theoretical Literature Review

2.1.1. Taxonomy of Values of Environmental Resources

In the environmental economics literature we can see several ways of classifying values of environmental resources. Freeman (1979), and Mitchell and Carson (1989) have presented classifications of resource benefits from environmental improvements perspectives.

Freeman (1993) has classified environmental service flows in terms of their 3 different sets of features: one way of classifying environmental resource service flows is according to the legal and administrative responsibilities for controlling the pollution or damage that would occur on different environmental resources (e.g. air, water, fisheries,

forests, etc); another way of categorizing environmental resource benefits is in terms of their effects on humans either directly (e.g., on human health) or indirectly (e.g., through impacts on ecosystem and inanimate systems). Finally, environmental resource benefits are grouped according to their effects on the market system (e.g., in the form of changes in incomes to producers and impacts on consumers in the form of changes in the availability of and prices of marketed goods and services).

Loomis (1987) classified natural resource values by their use values and non-use values. The analysis of total economic benefits of environmental resources can in general be broken down into two categories: use values and non-use values.

The total use value of environmental resources can be sub-classified into four categories: direct use value, indirect use value, option value and quasi-option value while the non use values can be sub-divided into bequest value and existence value (see Bateman et. al. 1993).

Direct use value of environmental resources refers to the active use of these resources in terms of the current values that people are deriving from their actual use of environmental resources. For example, values associated with the ability to benefit from supply of fish in an unpolluted lake, obtaining timber from forest, etc.

Indirect use values of environmental resources could be recognized from their biological mechanisms or ecosystem impacts. Environmental service flows have impacts on

economic productivity of ecological systems (e.g., agricultural productivity, forestry, commercial fisheries, etc.) and they may have other ecosystem impacts (e.g., recreational uses of ecosystems - fishing, hunting, etc. and ecological diversity, stability, etc). These ecosystem impacts of environmental resources have some indirect use values.

Option values correspond to the values that people attach to environmental resources that they may use in the future though they do not use them currently. If a recreation area, for example, exists, people maintain the option to visit it at some point in the future. Thus, knowing there is guaranteed opportunity for future access to the resource has some values.

Quasi-option values are related to future benefits of environmental resources that would result from future use due to future discoveries on new use of the resource but do not belong to current development activities. People attach some value to future use of environmental resources, which would be made impossible by today's development decision. Thus, quasi - option values refer to future benefits of environmental resources derived from their future use under new future discoveries on new use of the resource that are intact by current development decision.

Bequest values are placed by individuals on environmental resources, which might be passed on to future generations. They capture the willingness to pay (WTP) in terms of people's desire to bequeath certain environmental goods and services to one's heirs or

future generation. These values are said to arise from a sense of stewardship or responsibility for preserving certain features of natural resources and a desire to preserve options for future use by others. Thus, knowing that future generations will have the opportunity to enjoy environmental goods and services people attach these values to the resources.

Existence values are values placed on environmental goods and services, which are not related to consumption of the goods and services. Even if a person knows that they will never get to visit a place, they derive some value from the knowledge that it exists. Thus, knowing that environmental goods and services have been preserved in perpetuity, even if no recreational use is contemplated, people attach these values to the resources. All these components of value of environmental resources can be shown in the following figure.

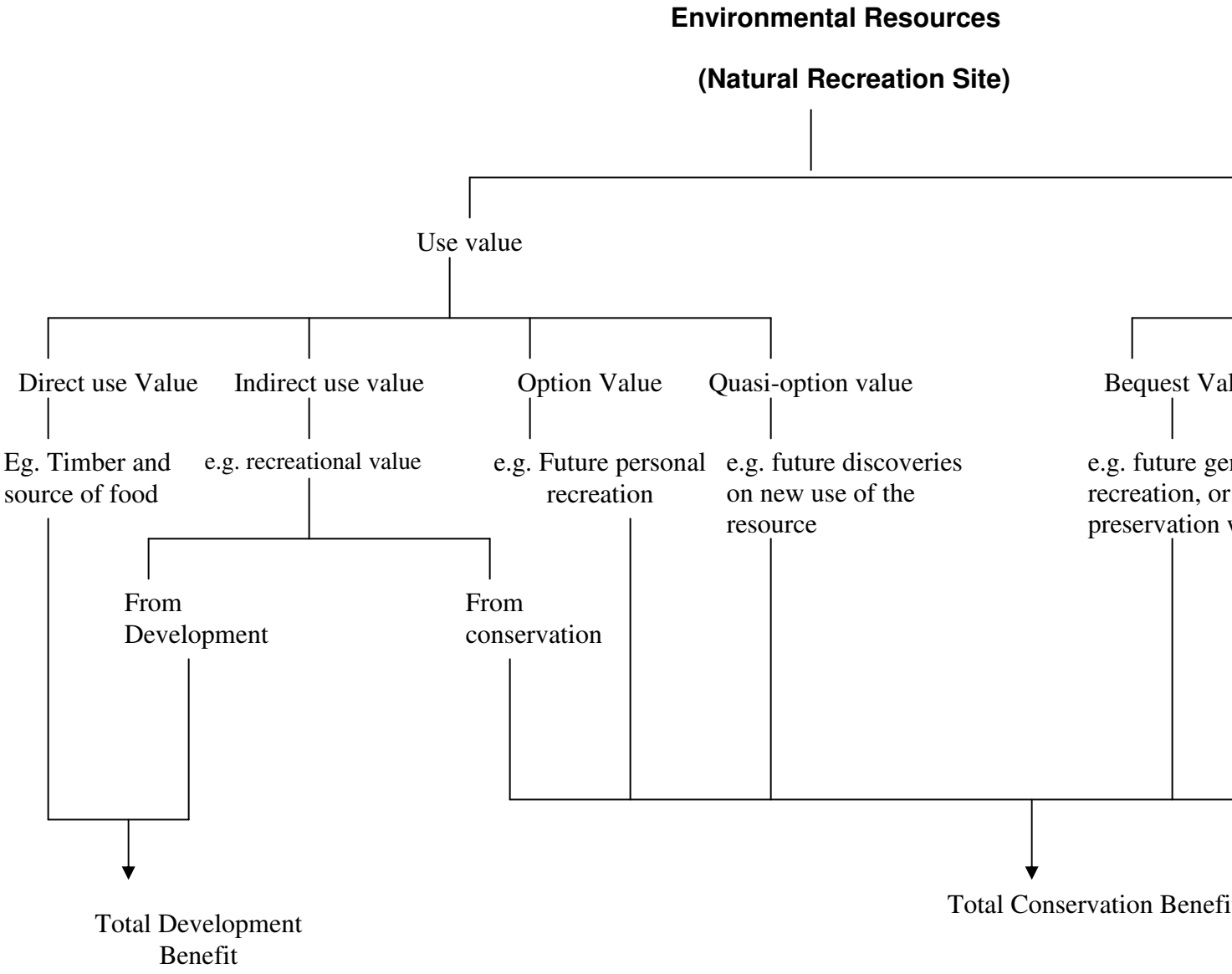

Fig. 2.1. Total Economic values of an environmental resource (Adopted from Bateman et. al., 1993)

To approximate the economic benefits of environmental resources, all these use and non-use values of environmental service flows should be taken into account. The task of internalizing all components of environmental resources requires a reasonably adequate amount of time and financial resources. However, it is reasonable to put some monetary measures on one of the components of value of environmental resources subject to the available time and financial resources because it is better than none at all.

In this study, therefore, an attempt is made to measure the current economic benefits of the recreation site using the available time and financial resources. It would be a good start to perform a complete estimation of total values of environmental resources for further research work on the area.

2.1.2. General Approaches of Valuing Environmental Benefits

In the environmental economics literature we have different valuation methods of environmental benefits. These valuation methods are usually divided into two: Direct methods and indirect methods (Hanley et. al., 1997). Direct methods seek to infer individuals' preferences for environmental quality directly by asking them to state their preferences for the environment. Indirect methods seek to recover estimates of individuals' willingness to pay (WTP) for environmental quality by observing their behavior in related markets.

Direct Valuation Methods

Direct valuation methods include the contingent valuation method (CVM) as one of the stated preference methods. The basic concepts behind CVM are to create a hypothetical but realistic market situation for non-market resources, communicate to people about the contingent market and have their responses to this hypothetical market. The name contingent derives from asking people that what they would be willing to pay is contingent/dependent up on some hypothetical change in the state of an environmental resource. People are directly asked to tell us, for example, their willingness-to-pay (WTP) for some changes in environmental resources. Then, this information can be used to estimate economic benefits associated with the provision of these resources. CVM is the only method available for valuing bequest, existence and option values of environmental resources.

Contingent-ranking method is another stated preference method. Contingent ranking method is based on asking people how they rank alternatives rather than how much they would be willing to pay for goods. Under constructed markets, respondents are asked to rank a series of choices involving hypothetical money transactions and various goods and services, i.e., individuals are asked either to rank a list of environmental options or to choose between pairs of choices. CVM is the most commonly used direct valuation method.

Indirect Valuation Methods

Indirect valuation methods include TCM and HPM (Hedonic Pricing Method). TCM involves using travel costs as a proxy for the price of visiting outdoor recreational sites. It assumes weak complementarity between the environmental asset and consumption expenditure. TCM cannot estimate non-use values. There will be more discussion about TCM under sub-section 2.1.3.

HPM is an indirect valuation method that could be used to estimate the value of an attribute, e.g., site quality, of an environmental resource (such as unpolluted area). In other words, the HPM, through multiple regressions, decomposes the total value of a good into the value of its several attributes. Hedonic price means an implicit price and the method assumes that the value of the attribute is capitalized into the total value of the good.

2.1.3. Travel Cost Method (TCM) of Valuing Environmental Resources

2.1.3.1. The TCM

TCM is the oldest technique of valuation of environmental resources. In the literature, it is frequently mentioned that TCM originated in a letter from the economist Harold Hotelling to the director of the US park service in 1947. As a research technique,

however, it was first used in the economics literature by others such as Wood and Trice (1958) and Clawson and Knetsch (1966). The basic approach is sometimes referred to as the Clawson-Knetsch approach.

TCM is one of the techniques used to value non-market environmental goods using households' consumption characteristics in related markets. TCM is often used to assess the value of parks, lakes and similar public areas which host a good deal of recreational activity; it is predominantly used in outdoor recreation modeling with several recreational activities. This method is usually applied to three valuation problems: Recreational services flow of an existing site; ex-ante value of a new recreational site; and change of the environmental quality of a recreational site.

By observing how visitation rates to a site change as the environmental quality of the site changes, the method also provides values for environmental quality itself.

The fundamental insight that drives this model is that if a consumer wants to use the recreational services of a site he/she has to visit it. The travel cost to reach the site is considered as the implicit or the surrogate price of the visit, and changes in the travel cost will cause a variation in the quantity of visits. Observation of these visitations across individuals will permit the estimation of demand functions and the derivation of the welfare measure.

TCM is the most widely used technique for determining the demand for outdoor recreation sites. There are some assumptions considered to employ it in practical economic analysis.

Key attributes /assumptions of TCM:

Admission fees (often low or non-existent) to recreation areas are an inadequate measure of the value of a visit to recreation site and the cost of round-trip travel is a proxy measure of WTP to visit a recreation site.

Recreation site users will react to changes in gate fees in the same manner that they react to changes in travel cost.

The basic method assumes the case of a pure visitor, i.e., the trip to the site is for the sole purpose of visiting the site. However, this case is only one possible situation of real life. Other possibilities are that the visit to the site is only part of the trip program or that the visit is explained with other interests (e.g., visit of relatives). The travel cost and time should in this case be allocated among different purposes.

It is also assumed that the recreational site produces neither utility nor disutility, i.e., the journey itself yields no value. In fact it may happen that the trip itself produces some benefits to the traveler. In this case the travel cost would be overestimated.

The opportunity cost of the time spent on-site and for traveling is generally assumed to be some fraction of the wage rates across the sample visitors. Some studies showed

that travelers are ready to pay at least a third of their hourly income to save an hour of traveling time (Button, 1993). Other studies used the full wage rate for on-site time (Ward, 1983 and McConnell et.al., 1981). However no general consensus exists on this point (Mendes, 2002), i.e., there is no clear-cut method for estimating opportunity cost of time.

One basic model assumes that there is only one site to visit. In the real world, however, visitors often have the possibility to choose among substitute sites. In this case, the number of visits that consumers take to the site surveyed will depend not only on its implicit price but also on the implicit prices of any substitute. If these are not accounted for, the parameters will be biased.

Weak complementarity relation between the environmental asset such as (scenery) and the private good (such as visits to the site) is assumed to measure how visitation rates to the site change as the environmental quality of the site changes.

Weak complementarity between the environmental asset and consumption expenditure implies that when consumption expenditure is zero, the marginal utility of the public good is also zero. If traveling to a recreation site, for example, becomes expensive, then no one goes to the site any more and hence the marginal social cost of a decrease in the quality of that site is also zero. Thus, TCM cannot estimate non-use values.

With these basic assumptions of TCM, it uses the costs of travel and the value of travel time as a proxy for WTP for outdoor recreation sites. Clawson and Knetsch (1966)

suggested travel costs as the sum of distance traveled costs, time taken costs and entrance fees costs. Specifically, the total sum of expenditure of services obtained from a site visit consists of the following 4 elements.

- ►Direct travel expenses (e.g. money expenditure on fuel transport, hotels, etc.).
- ►Time cost of travel (opportunity cost of travel time)
- ►Cost of time spent at the site (opportunity cost of on-site time).
- ►Entrance fee (if any).

It is assumed that a representative visitor's utility function is "separable" in the recreation activity being modeled. Say, if the activity of interest is boating, then the demand for boating can be estimated for boating trips independently of, for example, the demand for other alternative leisure activities.

The TCM permits estimation of a negatively sloped demand curve because the observations on individual cost (travel cost) and number of visits varies inversely across the population of visitors. This variation permits estimation of the Marshallian demand curve for the recreation site using which consumer surplus is measured.

2.1.3.2.Theoretical basis for valuation of environmental goods

Here we present a conventional theoretical framework for valuing environmental benefits for outdoor recreation. This basic theory is presented as developed by Brookshire et. al. (1982), Bateman et. al (1993) and recently summarized by Freeman (1993). A given

household will have a utility function which comprises a vector of the quantities of market goods (X), a vector of environmental goods, e.g., recreational activity (Q) whose quantities or qualities are fixed for individuals, and a vector of time spent in various activities (T) that yield utility to the individual. Specifically:

$$U= U(X, Q, T) \ldots\ldots\ldots \quad (1)$$

In our case, a household's utility is also composed of visits to a recreational site that yield utility to the individual. Furthermore, traveling to a recreational site could be significant in a household's utility function. Let's denote V_j = recreational visits to recreation site j and D_{ij}= total distance traveled by an individual i to site j. Both Vj and D_{ij} are explained as a vector. Thus, a household's utility function can be specified as follows:

$$U=U(X, V_j, V_jD_{ij}, Q_j)\ldots\ldots \quad (2)$$

Each rational household maximizes this utility function subject to the budget constraints:

$$Y - \Sigma FV_j - \Sigma TCV_jD_{ij} - X = 0 \ldots\ldots \quad (3)$$

Where F = entrance fee (which is non-existent). Hence: equation (3) becomes:

$$Y- \Sigma TCV_jD_{ij} - X = 0$$

$$T - \Sigma StjVj - \Sigma tt_{ij}V_jD_{ij} = 0. \ldots \quad (4)$$

Where: -

Y = Disposable income of a visitor

TC = Travel cost per km (money expenditure on travel)

T = Total time spent for recreation

t_j = Time spent on site j per visit

tjVj=Total time spent on site j for the number of visits at site j.

tt_{ij} = Travel time per km for a single visit of individual i to site j.

$tt_{ij}V_jD_{ij}$= Total travel time for a number of visits of individual i to site j.

In equ (2) above, the utility function is assumed to be increasing in X, V_j and Q_j. However, the utility obtained from V_j D_{ij} (total travel) cannot be known a priori.

$$\frac{\partial U}{\partial X} = Ux \geq 0$$

$$\frac{\partial U}{\partial V_j} = U_V \geq 0$$

$$\frac{\partial U}{\partial Q_j} = U_Q \geq 0$$

But $\frac{\partial U}{\partial V_jD_{ij}}$ is indeterminate a priori.

By forming the Lagrangean function and considering first order conditions with some re-arrangements, we obtain:

$$\frac{U_V}{Ux} = -\Sigma TCD_{ij} + \lambda \Sigma tt_{ij} D_{ij} \quad \text{.....} \quad (5)$$

$$\frac{\partial U}{\partial V_j} = -\mu \Sigma TCD_{ij} + \lambda \Sigma tt_{ij} + \lambda \Sigma tt_{ij} D_{ij} \text{.....} \quad (6)$$

$\frac{\partial U}{\partial V_j}$ = marginal utility of a visit to site j

$\mu \Sigma TCD_{ij}$ = Opportunity cost of travel to site j

$\lambda \Sigma tt_{ij}$ = Opportunity cost of time spent on site j

$\lambda \Sigma tt_{ij} D_{ij}$ =Opportunity cost of time spent on travel to site j

The above equations demonstrate that marginal rate of substitution between recreational activities and consumption of goods with the TC associated with a visit is taken into account in equilibrium for a rational economic agent. An individual, therefore, equates the marginal utility of visits with his/her marginal cost incurred to maximize his/her utility.

Solving all the equations from the fist-order conditions we can obtain the Marshallian demand function (discussed in chapter 3): number of visits as a function of basic variables such as entrance fee (if any), money expenditure on travel, disposable income of visitors, environmental good (in this case is recreational visits) and distance traveled to the recreation site. Then, the total area under this demand curve is the total

recreational benefit associated with a given trip. It is in this way that the TC estimation technique is used to estimate the environmental benefit of the site.

2.1.3.3 Practical Approaches of Valuation of a Recreation Site using TCM

There are basically two methods in TCM: Zonal travel cost method (ZTCM) and individual travel cost method (ITCM). Under ZTCM, the entire area from which visitors originate is divided into a set of visitor zones. The researcher then defines the dependent variable as the visitor rate (i.e. the number of visits made from a particular zone in a period divided by the population of that zone). In the case of ITCM, the dependent variable is the number of site visits taken by each visitor over a period.

In this study, ITCM is used as almost all visitors came from one origin, Addis Ababa. Thus the discussion below focuses on ITCM.

2.1.3.3.1 Methodological framework to conduct proper TCM

This section reviews the general procedure that one should pursue to employ TCM in valuing a recreation site. The following 8 steps can, therefore, be used to carry out a study using TCM.

1.Description and identification of the site:

A clear description of the site to be surveyed is important both for interviewees and interviewers to know which is the object they are talking about. It will also help identify the site where interviews will be done. Sites could be identified on the basis of the following criteria: suitability of the area for tourism, actual flow of tourists/ visitors of the site, plans of the site for creating regional parks, etc.

2.Definition of the environmental good / service to be valued:

The good or service to be valued should be defined so that no misunderstanding will occur in the valuation of the site under consideration. Goods or services of a given recreation site can be the whole area of the site, one of the particular services provided by the site (eg. enjoyment from beautiful weather, landscape, scenery of the lake, boating, swimming in the lake, etc), or the change in the supply of one attribute, both in quality and quantity terms.

3. Questionnaire design:

The questionnaire is aimed at collecting information on the consumers' behavior towards the particular environmental good/service to be valued. Information can be subdivided into compulsory and non-compulsory information. Compulsory information includes the origin of visitors, mode of transport of visitors used to get into the site, individual socio-economic features (e.g., age, education, income, number of family members, etc.) that

are supposed to be important determinants in visitors' behavior towards recreational use; non-compulsory information involves travel cost and opportunity cost of time (i.e. those variables that can be estimated outside of the questionnaire). Then, the information provided by the questionnaire will allow the researcher to derive the demand curve for the recreation site.

4. Survey strategy:

This step is mainly concerned with the organization and conduct of the survey. Before proceeding with the survey, it is recommended that:

The type of interview and the sample of interviews should be defined. Though the type of interview could be mail interview, telephone interview, on-site face-to-face interview or outside the site face-to-face interview, it is recommended to use on-site-face-to-face interviews. The sample size is also a very important point to address for a proper and reliable estimation of the economic value of the site.

The enumerators should be trained to avoid risks of misinterpretation of the questions and responses and to collect the requested information without influencing the respondents' answers.

A pre-test should be conducted to check the goodness of the questionnaire. A plan of action should be formulated stating the number of interviews to be undertaken per day,

how the interviews should be distributed over the days, the weeks, the months; and when the enumerators should interview the visitors.

5. Statistical description of the sample:

When the survey has been completed, a database is created using a spreadsheet. Some statistical description will be carried out using measures such as mean, median, variance, etc. and accordingly, the behavior of specific variables will be elaborated and their consistency and suitability will also be checked through appropriate statistical analysis.

6. Estimation of the demand function:

Basic approaches require models to be estimated by ordinary least squares (OLS). More complex ones (exponential forms such as Poisson, truncated Poisson and negative binomial Poisson) require the use of Maximum Likelihood Estimation (MLE) methods.

7. Calculation of individual and aggregate consumer surplus (CS):

Once the most suitable functional form has been estimated and the type of TCM used has been selected (between ZTCM and ITCM)**,** average visitor CS by zone or individual CS can be calculated accordingly.

Since ITCM is employed in this study, the individual CS is computed by calculating the area under the demand curve and above the average travel cost. Then, the individual CS resulting from the analysis will be multiplied by the total number of visitors of the site during one time period (usually one year) to get the total annual CS.

8. Interpretation and presentation of results:

Eventually the research results are supposed to be explained, interpreted and compared with those of other similar studies (if any).

2.1.3.3.2. ITCM

This section reviews a detailed step-by step approach for the calculation of the WTP for ITCM. The dependent variable is the number of site visits taken by each visitor over a specified period

Basic models of ITCM

The demand curve in this model relates individual's annual visits to the costs of those visits.

That is:

$V_{ij}= f(TC_{ij}, X_i)$

Where

V_{ij} = Number of visits taken per year by individual i to site j.

TC_{ij} = Visit cost faced by individual i to site j

X_i = All other factors determining individual i's visits (income, time and other socio-economic characteristics)

The demand curve for the site is defined by $V_{ij} = f(TC_{ij})$. Integrating under this curve gives us the estimate of the consumer surplus per individual. The consumer surplus for the site is obtained by multiplying individual's annual consumer surplus by the number of individuals visiting the site annually.

Step by step procedure for ITCM

1. Sample selection and survey (P observations)

Random sampling is appropriate but seasonality must be considered to obtain representative sample

2. Elaboration of calculated variables and statistical description of data

Descriptive statistics allow to get a first idea of the nature of the data collected.

3. Choice of the functional form for the individual demand curve.

Appropriate statistical tests need to be conducted to select a better specification among the available functional forms.

4. Estimation of the demand function of the recreational service

$V = f(TC, X)$

Individuals with the same (modeled) features behave in the same way

5. Calculation of the individual CS observation by observation

Formulas of CS depend on the specific functional form selected for the demand in the previous step

6. Calculation of the average sample CS

This is the average of individual CS

7. Aggregation of sample CS and further elaboration of CS

Sample CS per visit must be multiplied by the total annual number of visits

8.. Interpretation of results

WTP for specific social groups can be calculated

2.1.3.4. Problems with the TCM

As mentioned in the literature, the basic problems with TCM include the following (See Bateman et. al., 1993 for details):

The choice of dependent variable: There are two options for choosing the dependent variable: Visits from a given zone which are frequently expressed as visits per capita

(V/Population) or visits taken by a given individual which are usually implemented by collecting data on visits per annum (VPA) for each visitor. In the literature, one is not theoretically considered as superior to the other. However, consumer surplus estimates for a given site vary substantially according to which measure is used for the dependent variable. As mentioned in Bateman et. al, (1993) Willis and Garrod (1991) took a sample of visits of UK forests. They concluded that using individual VPA instead of zonal V/population reduced the non-market recreation value of UK estate of the Forestry Commissions from USD 53.00 million to USD 8.66 million.

In using ITCM, we face the following major problems:

1.Complexity and difficulty:

ITCM necessitates a more labour-intensive data collection process because it necessarily requires the collection of all data from each site visitor. This makes ITCM relatively more complex and difficult. The collection of all relevant data from each visitor of different origins is expensive and time taking to conduct the survey.

Hence, much of the literature on the subject presumes the adoption of ZTCM i.e. recreationists are classified according to their zones of origin and their visits are usually expressed as visits per capita (visits/population).

2. Specific characteristics of the site:

TCM basically measures the demand for visits to the site as a whole. It doesn't measure the demand for visits to the improvement of specific features of the site (e.g. water quality). Hence, with basic TCM there is no way to value improvements in site quality.

3.Multi-purpose trips:

The trip itself is assumed to yield no utility; if the trip itself yields value to the visitor then the TCM will overstate site benefits. Conventionally, visitors can be classified as:

Purposeful visitors: These are pure visitors whose sole purpose of their trip is to visit a site. Their trip is strongly site oriented and hence all their travel costs belong to the site.

Meanderers: For this group of visitors, a visit to the site in question is only part of the purpose for their journey. They are supposed to make multiple purpose trips. Obviously, some of the travel cost for the meanderers to the site under consideration should be excluded from the minimum value they place on a day out in that site. This is because they also visit another area during the same trip. Thus, some of their travel costs should be apportioned to the site under study. But how much?

In the case of meanderers, there are two options to include their travel cost to the specific site.

To ask people to score a relative importance of a visit to the site under consideration. i.e. relative to their enjoyment of the entire trip. This score, expressed as a number between 0 and 1, can be used to weight their total travel cost (Hanley and Ruffel, 1992 in Beteman et. al., 1993).

Meanderers may be excluded from the TCM analysis and a per visit consumers' surplus is computed based on these functions. Then this average visitor consumers' surplus can be aggregated across all visitors. Hence, TCM cannot effectively value multiple trips. Thus possible solutions are either excluding multiple trips or allocating costs to various trips.

Holidaymakers vs. residents: People may travel from temporary holiday accommodation to the recreation site under consideration. Their valuations could be measured by looking at these daily travel costs. However, part of their reason for going to some area near by a recreation site may be due to the existence of this recreation site. Then, some of their travel costs from their permanent residence to their temporary holiday accommodation should be allocated to the valuation of the recreation site. Thus, there is a problem of allocating fixed costs to specific trips. The possible solutions for this problem are:

1 To ask people to score a relative importance of the site under consideration; or to exclude holiday-makers; or

2 to treat holidaymakers no differently from day-trippers and consider only their daily travel costs. However, these cannot be a guarantee for the total value to be free from bias

4.The Travel Cost of nearby residents

TCM requires significant variation in travel cost. If all residents are near by the site, there is probably too little variation in travel cost. This may be a problem for estimation of the demand function. But note that even though all visitors come from the same origin, their opportunity cost of time could not be identical to all visitors.

5. Calculation of distance costs

Calculation of the cost of distance traveled may take two options:

1. Use petrol costs only as an estimate of marginal cost, or use full cost of motoring to include an allowance for depreciation, insurance, etc for those who used their own cars.

2. Use transport cost for those who used public transport /buses

Then, consumers' surplus approximation of a given site varies significantly, according to which option is chosen.

6.The value of time

Time is expended both in traveling to a site and while recreating on the site. As a scarce commodity, time clearly has an implicit (shadow) price. In the recreation demand literature the treatment of time costs is so controversial.

The argument over the value of time stems from the notion of opportunity cost. It is true that a person traveling to a site bears the cost of not using that time doing something else in addition to monetary costs of trip. The opportunity cost is, therefore, the person's utility obtained by doing his/her next best alternative activity in the time spent traveling to the site.

If individuals give up working time in order to visit a site, the wage rate may be a correct measure of opportunity cost. However, most recreation time is spent at the cost of alternative recreational activity i.e. the opportunity cost will be measured as to the marginal value of other recreational activities forgone. Ideally, a separate value would be computed for each individual because each will have a different set of alternatives and differing valuation of these options.

The conventional travel cost models assume labour market equilibrium so that the opportunity cost of tie used in travel is given by the wage rate (Becker 1965). McConnell and Strand (1981) and Ward (1983) also estimated the opportunity cost of time to be full wage rate. However, much dissatisfaction has been expressed over measurement and

modeling of opportunity time values. McConnell and Strand (1981) suggested that the opportunity cost of time needs to be determined by a large complex arrangement of institutional, social and economic relationships and yet its value is crucial in the choice of the types and quantities of recreational experiences.

The opportunity time value methodology has been criticized and modified by many authors.

As mentioned in Bateman et. al. (1993), several authors followed different approaches to proxy the value of time costs incurred by visitors of a recreation site. Cesario (1976) suggested a value of 2/3 of the hourly wage rate after reviewing empirical evidence. However, McConnell and. Strand (1981) and Ward (1983) estimated the opportunity cost of time to be full wage rate. Smith et al. (1983) rejected both results of Cesario and McConnel and Strand by comparing their results for 23 recreational sites in the USA. Thus, whichever option is considered to value the opportunity cost of time whilst recreating will bias benefit estimates. The absence of clear-cut method for estimating the opportunity cost of time may be prejudicial to benefit estimates of the sites.

The consensus is that the opportunity time cost component of travel cost has been its weakest part. Fletcher et. al (1990) said that the cost of travel time remains an empirical mystery and site values may vary fourfold depending on the value of time.

Despite the fact that there has been disagreement among practitioners in the design of the travel cost model, there is a consensus among scholars that opportunity cost of time

should be incorporated in estimation of recreational demand. McConnell (1992) argued the opportunity cost of on-site time should be included in recreational demand estimation. He argued that failure to count the opportunity cost of time would bias downward consumer surplus estimations though he recognized that accounting for opportunity cost of time is the major problem in recreational demand estimation exercise because of absence of developed systematic method both conceptually or empirically.

Smith et. al (1983) argued the opportunity cost of on site time should be included in recreational demand estimation. They argued that opportunity cost of time is related to the wage rate indirectly through the income effect if recreation time cannot be traded for work time, and they found that the opportunity cost of time varies considerably among individuals. Ward (1984) also argued that opportunity cost of time must be included in recreational demand estimation.

Thus, past research has shown that assumptions on time values were determinant to estimate values of recreation activities as well as recreation value of natural resources. To meet the conclusions obtained in several TCMs. According to which the cost of opportunity is an important variable to explain the behavior of demand recreation, it is of great importance to include opportunity cost of time to better explain the behavior of recreational demand.

Fletcher et .al (1990) setout a different approach to estimate the opportunity cost of time. i.e. using contingent techniques to assess each individual's perception of the time cost

by simply asking the respondent directly or an alternative is to introduce in the traditional TCM's survey questions to assess individual's time value.

7. Statistical problems

In TCM, the dependent variable (visits) may be censored and truncated. With censoring, OLS (ordinary least squares) estimates of demand parameters will be biased (Smith and Desvouges, 1986 in Bateman et. al., 1993). Maximum Likelihood (ML) estimator is then used instead of OLS. Then, we face different functional forms as mentioned under 2.1.3.3. Consumers' surplus estimates, therefore, change according to which functional form is employed. The possible solution is using statistical analysis to select the preferable functional form that would better estimate the recreational benefit and consumer surplus. When we say the dependent variable is truncated we mean that only visitors to the site are considered, i.e. potential visitors are ignored. Furthermore, the independent variable may incorrectly describe the preferences of visitors who visit the site at other times of the year because visits are only recorded during the survey period.

Advantages of TCM

Despite all its weaknesses mentioned above TCM has several advantages.

i) TCM is based on observed behavior. The travel data that are generally obtained by a visitor survey are used to derive the demand curve for the site under consideration.

ii) TCM can be applied effectively and relatively inexpensively to a site when situations at alternative sites are expected to stay constant.

iii) TCM is a well-tried technique that produces plausible results.

There is some evidence that TCM results are similar to CVM results (Johansson, 1987 in Abelson, 1996)

2.2 Empirical Literature Review

2.2.1 Application of TCM in Valuing Outdoor Recreation Sites in Ethiopia

A few studies have looked into the valuation of different recreational sites in Ethiopia. Mahmud (1998) conducted a research to estimate the economic valuation of Sodere natural recreation area and demonstrated that the total amount that the site authorities are collecting through gate fees from visitors per year does not reflect the true, social recreational benefit of the site.

In his study, 232 sample visitors were used as his samples that represent visitors in different recreational activities such as Main Swimming Pool, Little Swimming Pool, Common Bath and Abader Bath in the site. Then, random selection was adopted to interview individual visitors at each stratum. The interviews included both objective questions and visitors' opinion. In the TCM, a linear demand curve was estimated.

In this study, visitors' total enjoyment into travel and on site experience was allocated by asking them how much value they attach to their travel and on-site experience. Then,

taking the mean value for the on-site experience to be 68.5%, (as calculated from the sample), per person annual recreational benefit for the on-site experience was estimated as Birr 759.07x68.5%=Birr 520. Considering the annual visits of 171,336 as obtained from the data and taking the mean value for per person annual visits of 9.069 in the sample, he estimated the expected total on site recreational benefit of Birr 9,824,094.80 per annum. But, the site management collected from Birr 50,000 to 100,000 from gate fees each month to finance its expenses and salaries for employees of the site.

However, TCM does not measure the demand for visits to the specific features of the site (e.g., for different recreational activities at the site such as for main swimming pool, little swimming pool, etc). Thus there may be no need to cluster samples of visitors for different type of recreational activities at the site for TCM basically measures the demand for visits to the site as a whole.

Terefe (2000) examined the economic value of Tis-Abay Water Falls using TCM. In his effort to measure the value of outdoor recreation for this site, 140 visitors were used as his sample groups by residence on the basis of distance from the site. In the interview, socio-economic demographic and attitudinal information were gathered from the respondents. Then, using this information on the percentage of sampled visitors from each of the zones, total visitors per year and the population in each zone, the visit rate per 1000 population in each zone was determined.

In his model, he took income, taste, availability of substitute sites, quality and population in addition to travel cost to explain visitation rate /1000 population at zero admission fee. Then, TCM was estimated using semi-log independent functional form after dropping insignificant variables.

The study indicated that the optimal gate fee is Birr 40 and the maximum expected revenue for the site is Birr 85,812,000 (=40x21378) where 21378 is the number of total visits per year. The economic value of the park was estimated at Birr 2,181,998,095 per year based on the demand curve.

2.2.2 Applications of TCM in Other Developing Countries

Kateregga (1997) employed TCM to measure the value of Kaazin Camping Site (recreation Site) in Uganda.

In her effort to estimate the total benefits of the site, 200 adult visitors who came from five different zones were used as her samples. Children visitors were not included in the sample due to the reason that they may not come to the site by their own motivation. Interviews were carried out on Saturdays and Sundays alone because of very few visitors during weekdays. The data on average travel costs per zone and visit rate in relation to population densities in each zone were used to construct the demand curve for recreational services at the site. The total annual visit rates originating from each district were derived by multiplying the average frequency of visits from each district by

the number of respondents from the zone. The area below the demand curve,therefore, estimated the total benefits of recreational services at the camp.

Thus, using this demand equation the study reported different consumer surpluses that accrue to each marginal visit per 100,000 population from the five zones. These values of consumer surplus for the five zones were used to calculate a weighted average;and the weighted average consumer surplus was 88889.5 shillings. The total consumer surplus was 17,777,900 shillings per year, which was computed as the weighted average consumer surplus 88889.5 multiplied by 2000, which is the average number of people who visited the site per year.

In this study, whether variables such as age, education, family size, gender and marital status would determine number of visitation was not considered. Furthermore, in the estimation of the recreation demand function, OLS (Ordinary Least squares) is used. However, since the dependent variable is both censored and truncated, OLS estimates of demand parameters will be biased (Smith and Desvouges, 1983). The Maximum Likelihood (ML) estimation should rather be used.

Using a sample of 600 visitors, Du Yaping (1995) conducted a research using TCM to value improved water quality for recreation in East Lake, Wuhan, China. In the interviews, information about respondents' social and economic conditions such as income, education, age, sex, etc were gathered. The demand equation was derived using visitation rate as a dependent variable and travel cost as an independent variable.

The results showed that the functional form used was semi-log and travel cost was the major determinant of demand.

Brown and Henry (1989) carried out a study using the TCM on the viewing value of elephants in Kenyan parks. In this study, a sample of 53 tourists was used to derive a linear demand curve to estimate the consumer surplus for the safari. The survey questions were designed to pick out the satisfaction that tourists obtain from a safari over a variety of activities in the safari park.

Brown and Henry estimated travel time costs as part of total travel cost by multiplying the hourly wage rate, round trip travel time and a 30 percent weighting.

More recently Sharawi (2002) conducted a research using TCM to value the recreational service provided by Khartoum Sunt forest.

In this study, data was collected through paying six visits to the forest during the weekends in the dry season as the forest is inaccessible during the rainy season. Random samples of 60 actual visitors of the site were interviewed about their characteristics, place of residence, distance from the forest, mode and cost of transport, etc using structured questionnaires.

In the study, distance cost was estimated for the different modes of travel. For those who used public transport (e.g., bus) to reach to the site, the value of round trip ticket

was used while for those who used private cars; the running cost of travel in terms of fuel expenditure alone was computed for individuals.

The opportunity cost of time was estimated in two alternative ways to arrive at the best-fitted model. One way was giving it a zero value where only the distance cost was used as a proxy for price. Alternatively, the mean wage/hour for each occupation group was computed from the mean income and added to travel cost. However, the opportunity cost of time was set equal to zero for adding the mean wage/hour of time to travel cost did not yield satisfactory results.

The study found that the average number of visitors for the six-months of the year during which the forest had been accessible was 3619.5 visitors. The mean number of visits was 12.83/year.

The estimation of individual consumer surplus was calculated using the formula N/-B where N is the average total number of visits/individual and B is the coefficient of the travel cost estimated in the equation.

In this study, the opportunity cost of time was set equal to zero for it was assumed that adding it to travel cost did not yield satisfactory results. Mendes (2002) showed that taking opportunity cost of time spent on recreation is appropriate to better explain the nature of demand recreation. Furthermore the sample size was very small which might have biased the results of the study.

2.2.3. Applications of TCM in developed countries

Mendes (2002) used TCM to estimate the recreational benefits of Penda-Geres National park in Portugal.

Though 1000 questionnaires were distributed, only 243 were filled out and this sample size was used to derive the demand curve for the park. The questionnaire was composed of three blocks of subjects: Socio-economic characteristics, the nature of the trip to the park and the visitors' available income.

In this study, Mendes attempted to measure the benefit of the Peneda-Geres National park's visitor per each day of using the natural resource. In this case, the benefit of the park's visitor per each day of using the natural resources was defined as being the relevant area under the parks Marshalian recreation demand curve. The Recreation Produced in the Park by the i^{th} visitor was measured in days of recreation per average visit with the price of a recreation day in the park. This price was assumed to be equal to travel costs and on stay costs, per each day of visit.

The study obtained that the average number of on site days per each sample visitor was 5.284; and it showed that a medium length recreation visit to the park generated a surplus from Euro 250.65 to Euro 274.08 depending on the type of opportunity recreation time cost one considered (i.e. when the opportunity cost of recreation time was considered to be 33% or 50% of the visitor's real per capita recreation income.)

Taylor (2000) carried out a research using TCM to measure the economic value of outdoor recreation site "Snake River Basin of Central Idaho" in Moscow.

In this study of outdoor recreation in the Snake River Basin, mail surveys were used and 190 completely important responses were considered as a sample to derive the linear demand curve for the TCM. The TCM survey was designed to include money and time costs of on-site time, on site purchases, the money and time costs of other activities on the trip.

Bockstael et.al (1987) and McConnel and Strand(1981) attempted to estimate the travel cost using different models.

An important distinction between these two models is that in the McConnell and Strand Model, the equilibrium labour market requires that out-of-pocket and opportunity time value costs be added together to force an identical coefficient on both costs.

In Bockstael et.al model, however, the disequilibrium labor market model requires separate coefficients to be estimated for out-of-pocket costs and opportunity time value costs. Although the equilibrium labour market model requires that the marginal effects of out-of-pocket cost and income forgone on quantity demanded be equal, empirical results often fail to support the model if the two components of price are entered separately in a regression. Measurement and statistical problems often beset the full price variable in empirical applications, i.e., simple income questions are unlikely to elicit true marginal

opportunity time cost. In practice, marginal income specified by theory is usually replaced by a more easily observable measure consisting of average family income per unit time though marginal and average values of income are, unfortunately, unlikely to be the same.

Therefore, Taylor considered Bockstael's travel cost model and employed truncated negative binomial regression for appropriate demand curve estimation. Essentially, truncated Poisson or truncated negative binomial regression is appropriate for dependent variables with count data (integer). This is because Poisson and negative binomial regression functional form is mathematically equivalent to a logarithmic transformation of the dependent variable. In this study, the negative binomial regression functional form is preferred to Poisson regression model due to the following reasons:

Tests developed by Cameron and Trivedi (1990) were conducted and these tests indicated that over-dispersion was present in the Poisson regression model and it was found that convergence was not the problem of this data. If the variance of the dependent variable is not equal to its mean (over-dispersion), the significance of the coefficients in a Poisson regression can be greatly overstated. However, the negative binomial regression does not have this shortcoming though the iterative solution process sometimes fails to converge. Fortunately, convergence was not the problem of this data.

t-values appeared inflated in the Poisson regression model. The t-values found in the truncated negative binomial model were smaller than in the truncated Poisson model.

Taylor applied the truncated negative binomial regression and he found that consumer surplus per recreationist per trip was USD 87.24 .The average recreationist trips per year in the sample was 2.76. Then, the total surplus per recreationist per year was USD 241 per year.

Hackett (2000) carried out a research using TCM to estimate the recreational economic value of the Eastern Trinity Alps Wilderness in North Western California. A data set of 69 observations from 69 country zones of origin on 4473 individual visitors to the Trinity Alps Wilderness was used to estimate the resource demand curve. In this study, ZTCM was used to estimate the resource demand curve. In statistical analysis, two-stage process was employed.

First, the statistical technique of ordinary least squares multiple regression analysis was used in the first stage of the analysis to estimate a linear demand function for recreational use of the Eastern Trinity Alps. The dependent variable was the natural logarithm of per-capita country visitation rates. The independent variables included per capita income by country, the travel cost price of visiting the study area and the travel cost price of visiting other two substitute recreation areas (Yosemite and the Three Sisters Wilderness), by country zone of origin. Second, progressively higher travel costs to the study area were introduced to the estimated demand function to derive a set of forecasted visitation levels from each country zone of origin. These forecasted visitation levels were horizontally summed at each increment of additional travel cost, with the result being the final resource demand curve. Then, the net economic benefits that

flowed annually to recreational visitors to the study area were computed by calculating the area under the resource demand curve.

Hacket estimated that an individual visitor to the Trinity Alps Wilderness spent an average of USD75.93; and the statistical analysis estimated an average of USD29.38 in net benefits or consumer surplus from each individual's wilderness recreational experience or a total of USD 131,417 in net benefits (consumer surplus) from visitors' wilderness recreational experience.

CHAPTER 3 SURVEY DESIGN, EXPECTED SIGNS AND EMPIRICAL MODEL

The purpose of this study is to examine the economic value of the Wabi-Shebele Langano recreation site. The study employed TCM to estimate the consumer surplus of recreation trips. The travel cost model estimates demand through a comparison of the costs that visitors of the site incur while traveling to the site and average number of trips that they make during the survey period.

To achieve the objective of this study a structured questionnaire was designed and administered to a sample of visitors at Wabi-Shebele Langano recreation site. Then, on the basis of the information obtained from this questionnaire the demand function was estimated and accordingly the total recreational benefit of the area was calculated.

In the following sections of this chapter, the recreation demand survey design, the different travel cost demand variables and expected signs and recreation demand models are discussed.

3.1. Survey Design

3.1.1. Data Set

The Wabi-Shebele Langano recreation demand survey was carried out through on site face-to-face interviews of the recreationists of the site using structured questionnaire

during the survey period. Thus visitors of the Wabi-Shebele Langano recreation site were contacted at the site over the period from Jan 10, 2003 through Feb 3, 2003.

The questionnaire was designed to capture all the necessary variables that are used to establish the demand equation of the site. Accordingly, the questionnaire included detailed socio-economic characteristics of visitors (i.e., age, gender, marital status, family size, education level, income, and so forth) and main features of visits (i.e., the origin of visitors, length of stay at the site, number of other possible sites visited in the same trip experience, number of visits/year to the site, money and physical time costs of travel recreation, other activities carried out in the site, etc.)

3.1.2. Sample design

Having an appropriate sample size is obviously a crucial substance to obtain a proper and reliable estimation of the total economic value of the site under study. Given the time and financial constraints, 300 respondents from the visitors of Wabi-Shebele Langano recreation site during the survey period were interviewed on site and the data for 280 of these were analysed in this study. Almost all visitors came from one and the same origin, Addis Ababa, and each visitor had been selected randomly.

To get a random sample of the visitors interviewed on site, visitor statistics from previous years should be used to determine how many interviews to conduct each month of the season. Then, proportionally visitors should be interviewed each month. However, a random sample of visitors during the peak season when there is a large number of

visitors as compared to other seasons is often sufficient, as it can be considered as representative of the total visits undertaken in one year. In the case of Wabi-Shebele Langano recreation site, the peak season is January when 2045 visits were undertaken only in January 2002 (see table 1.1). Thus, the random sample of visitors taken in this study can be assumed to be representative of the total visits undertaken in one year. In the study of this sample of visitors, both cluster and random sampling techniques were used. First, the samples of visitors were proportionally grouped by weekday and weekend visitors based on the information obtained from annual sales reports of the Wabi-Shebele hotels enterprise. Second, after grouping the sample by weekday and weekend visitor vis-à-vis their respective proportion, visitors of each group were randomly selected and interviewed on-site using structured questionnaire.

3.1.3. Field strategy

It is important to design and follow a well-planned field procedure before the survey is going to be implemented. In this study, the following activities had been carried out before the survey was done.

The total number of monthly visitors of the site for the previous year was examined from annual sales report of the Wabi-Shebele hotels enterprise. Then, a sample of visitors was taken during peak season, which can be considered as representative of the total visits undertaken in one year.

Similar substitute areas of Wabi-Shebele Langano recreation site were recognized and principal recreational activities of the site were distinguished. Accordingly, they were put in the data set in such a way that the sample of visitors could rank their choices easily.

Enumerators were given both theoretical and practical training to avoid risks of misinterpretation of the questions to respondents during interview period without influencing the respondents' answers. Both the theoretical and practical trainings were conducted for four days starting from Jan 1 to 4, 2003.

A pre-test was conducted to check the goodness and applicability of the questionnaires and also as part of the training of enumerators since it would help enumerators exercise how to administer the questionnaire. This pilot survey was carried for 19 visitors for 2 days at the site.

From this pre-test survey, it was observed that visitors are reluctant to honestly fill in some of their household characteristics (e.g., their name, name of their family members, their age, their income). Thus, enumerators kindly explained to visitors that their responses to questions other than names are very helpful for this research. Some additional questions were also included after the pre-test.

A plan of action was formulated stating the number of interviews to be undertaken per day, how the interviews should be distributed over the weekdays and the weekends, and where the enumerators should interview the visitors. The questionnaire was distributed over the weekdays and the weekends according to the proportion of weekdays and

weekend visitors obtained from previous data at Wab-Shebele Langano Hotels enterprise.

The administration of the main survey was carried out during the period mentioned above. Under my close follow up, 3 enumerators and one supervisor accomplished this final task of the fieldwork as planned.

3.2. Variables and expected signs

3.2.1. Travel Cost

The total travel cost in this study is associated with a around trip to and from the Wabi-Shebele Langano recreation site. Travel cost entails the sum of expenditures incurred for petrol or transport cost, opportunity cost of time for traveling and for visit on site. Opportunity cost of time is calculated by the alternative payment visitors wish to be paid to forgo their visitation. In TCM, travel cost is considered as an approximate price for number of visits undertaken. Thus, an inverse relationship is expected between travel cost and number of visits in recreation demand analysis. It is also important to briefly discuss some measurement issues associated with the travel cost variable.

3.2.1.1. Measurement issues

TCM considers number of visits (V) as a dependent variable and travel cost (TC) and other socio-economic characteristics of visitors (X) as independent variables.

In functional form:

$V_i = f(TC_i, X_i)$ where i stands for individual i.

The travel cost variable (TC) basically consists of two costs: distance cost and time cost. Distance cost is measured by petroleum cost or public transport cost and other costs associated with trip. Time cost is measured by the opportunity cost of time.

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3.2.1.1.1. Measurement of distance cost

In this survey, an attempt is made to calculate the distance cost using two options:

- ✦ By directly asking visitors to estimate the cost they incurred to cover round trip
- ✦By considering the average distance that a car covers per liter of fuel and by considering the total round trip distance and the current price of fuel.

Though there were no significant differences between these two estimates(from the survey data), the distance cost estimated by visitors in the questionnaire was considered since it was believed that visitors in their estimate could incorporate all other costs associated with their trip.

3.2.1.1.2.Measurement of time cost

Though past research on the area has shown that the assumption on time values is an important determinant to value recreation sites, there is still no developed systematic

method to precisely estimate the opportunity cost of travel time, i.e., there is no consensus among scholars in the measurement of opportunity cost of travel time though all of them in principle agree with the inclusion of opportunity cost of time in the measurement of economic values of recreation sites using TCM. For example, Becker (1965), McConnell and Strand (1981) and Ward (1983) estimated opportunity cost of time by full wage rate in the measurement of different recreation sites using TCM. On the other hand, Button (1993) and others estimated opportunity cost of time to be one-third of visitors' hourly income.

Due to the complexity of the issue Fletcher (1990) noted that the cost of travel time remains an empirical mystery and site values may vary fourfold depending on the value of time.

Though opportunity cost of time component of travel cost has been the weakest part of TCM, Fletcher et al. (1990) set out an approach to measure opportunity cost of travel time by contingent techniques to assess each individual's perception of the time cost, i.e., by simply asking individuals directly in TCM survey questions rather than estimating opportunity cost of time by some fraction of wage rate.

In order to compare the benefits resulted from using different options of opportunity cost of time, 2/3 of visitor’s wage was taken to approximate the time cost component of travel cost. The regression result showed that there is no significant difference in the coefficients of travel costs estimated in the above two different options, i.e., estimation of

opportunity cost of time using either contingent techniques or taking 2/3 of visitor's wage (see appendix II, table C). This is a good indication that there is no major variation in the benefit estimates measured by employing those two options of opportunity cost of time measurements.

In this study, opportunity cost of time estimated by respondents themselves in the questionnaire was considered, i.e. individuals were asked how much they would request their institution/any economic agent to pay them if they were asked to cancel their visits. Using their responses, an attempt was made to estimate opportunity cost of time. This approach was preferred because it would be helpful to obtain relatively better estimates of opportunity cost of time as compared to taking 2/3 of visitors' wage rate or other arbitrary estimate of opportunity cost of time.

3.2.2. Other exogenous variables

These variables refer to all socio-economic characteristics that are supposed to influence the demand for recreation activity at Wab-Shebele Langano recreation site. Those factors that are expected to have effects on number of visits include visitors' income levels, educational levels, age, family size, acquaintance to the site, gender, marital status, mode of transport and visitation in group or alone and existence of substitute sites.

Visitor's income level refers to his/her individual monthly income. Since income reveals the ability to pay for frequent visits to a recreation site, number of trips to Wabi-Shebele

Langano recreation site and the site visitors' income are expected to have a positive relationship.

More years of education would generally be expected to lead to a better understanding of the importance and benefits of visitation of recreation site. Accordingly visitors' educational level is expected to have a positive relationship with the number of visits.

Visitor's age is measured in years. Age has been found to influence the demand for various types of recreation activity (Taylor, 2000). By intuition, one can imagine that as people get old they are less willing to travel long distance for recreation purpose. Hence, age is expected to be negatively related to the number of visits to a site.

Visitor's family size is measured by the number of persons in the visitor's household. As the number of people in a visitor's family increases it has a spill over 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.

Visitor's acquaintance of a site is measured by the number of years that visitors are familiar with the site. It reflects the number of years of experience that visitors have about the site. The extent to which visitors can have a preference for the site is directly related to the degree of their experience for the area hence, visitor's knowledge of the site is expected to have a positive relationship with the number of visits.

Visitor's sex is incorporated as a dummy variable. The relationship between gender and number of visits cannot be determined a priori. However, a value of 1 for male and 0 for female are assigned in this study to scrutinize whether gender is a significant determinant of number of visits to Wabi Shebele Langano recreation site or not.

Visitor's marital status is also expected to influence the number of visits. New marriage might increase frequency of visits to a recreation site. However, as people get married they are more likely to be engaged in social activities and they are less likely to make visits to recreation sites. Hence, the relationship between visitor's marital status and number of visits is also indeterminate a priori. This explanatory variable is incorporated in this study as a dummy variable where a value of 1 is assigned for married and 0 for single.

Visitors either take their own car or public transport to get to a recreation site. If they take their own car, transportation cost is more expensive than taking a pubic transport (Kateregga, 1998) though visitors will be expected to be more comfortable with their own car. Thus, visitor's mode of transport used to get into Wabi-Shebele Langano recreation site is included in this study as a dummy variable, where a value of 1 is assigned for own car and 0 otherwise. The relationship between mode of transport and number of visits to the site is not determined a priori.

Recreational visits in-group or alone is also included in this study as a dummy variable, where 1 is assigned for group visits and 0 for lonely visits. Hence, the relationship between this variable and the number of visits to the site is indeterminate a priori.

Substitute sites of Wabi-Shebele Langano recreation site are included in the study to examine whether they affect the number of visits to Wabi-Shebele Langano recreation site. These substitute sites are included in the study as dummy variables, where a value of 1 is assigned if there are visits to each substitute site, which are Bekele Mola substitute site, Bishangari substitute site, Abule Basuma Substitute site and 0 if there is no visit to each site to test if they have an influence on recreation demands for Wabi-Shebele Langano recreation site. Bekele Mola and Wabi-Shebele Langano recreation sites are expected to be close substitutes partly because since they have very close features and they are close to each other as the distance between them is 17km.

Visitor's position as a head of the family demonstrates the responsibility of the visitor to act as a chief or first person in his/her family. The relationship between being head of the family and number of visits is also indeterminate a priori. If many of the head's family members are economically and socially dependent upon him/her, the relationship between being a head of the family and number of visits might be negative. If the head of the family has small family size or many of his/her family members are economically and socially not dependent upon him/her, the relationship between acting as a head of the family and number of visits might be positively related. This explanatory variable is incorporated in this study as dummy variable where a value of 1 is assigned for being head of the family, 0 otherwise to observe if it determines the number of visits to Wabi Shebele Langano recreation site or not.

Visitor's occupation shows whether the visitor is a government employee or not. The relationship between visitor's occupation and number of visits is also indeterminate a priori.

3.3. Empirical model

The Wabi-Shebele Langano recreation demand study was carried out based on information obtained from actual visitors of the site during the survey period. Since potential visitors are excluded from the sample, the dependent variable is truncated. i.e. only number of visits greater than or equal to one is considered in this recreation demand model. Hence, ordinary least squares (OLS) might give biased estimator of the parameters. Since the dependent variable (number of visits) is truncated at a certain point, maximum likelihood estimation is taken as an appropriate technique in selecting recreation demand model.

3.3.1 The Truncated Model

The truncated model for the recreation demand function is adopted from Greene (2000: 896 - 905) as follows:

$$V_{ij} = \beta' X_i + \varepsilon_i \quad \text{.....} \quad (1)$$

Assuming $V_{ij} | X_i \sim N(\mu, \sigma^2)$ and $\mu = \beta' X_i$

Where V_{ij} = Individual i's visit to site j

X_i = Vector of explanatory variables for individual i

β = Parameters

ε_i = Error term

In this truncated model, we observe V_{ij} only if $V_{ij} \geq 1$.

Now, taking the density function of V_{ij} (truncated variable) with probability density function of $f(V_{ij})$, mean $\mu = \beta'X_i$ and standard error σ.

$$f(V_{ij} | V_{ij} \geq 1) = \frac{f(V_{ij})}{Prob(V_{ij}) \geq 1} = \frac{(1/\sigma)\phi [(V_{ij} - \beta'X_i)/ \sigma]}{1-\Phi (\alpha_i)} \quad \text{.....} \quad (2)$$

Where:

$\phi(.)$ = Standard normal probability distribution function

$\Phi(.)$= Standard normal cumulative distribution function

$\alpha_i = (1-\beta'X_i)/ \sigma$

Accordingly:

$$\mathbf{E}(V_{ij} | V_{ij} > 1) = \beta'X_i + \sigma \frac{\phi[(1- \beta'X_i) / \sigma]}{1-\Phi [(1-\beta'X_i) / \sigma]} \quad \text{.....} \quad (3)$$

$$\text{Var } (V_{ij} | V_{ij} \geq 1) = \sigma^2 [1- \delta (\alpha_i)] \quad \text{.....} \quad (4)$$

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 (3) with respect to X_i is equal to $\beta(1-\delta(\alpha_i))$ which is different from β.

In the estimation of the truncated model maximum likelihood (ML) estimation is used. STATA V.7 & LIMDEP V.7 are used to obtain the parameter estimates and marginal effects of the ML estimator.

3.3.2. Functional forms

The choice of functional form influences the results of travel cost studies, Ziemer et.al, Bowes and Loomis(1980). Although linear models are sometimes used in travel cost analysis, non-linear functional forms have provided better estimates to travel cost data in empirical studies, Stynes et al. (2001). Exponential and power functions are popular because of their ability to explain the data, McConnell (1975).

The simplest form of these two functional forms that are widely employed to empirically estimate a recreation demand using truncated models are the semi-log dependent and the double-log types. The terms" semi-log" and "double-log" derive from the transformation by which the corresponding exponential functions can be linearized via logarithmic transformation. These are:

Semi -log	:	$\ln V = \alpha_0 - TC$	= Log dependent
Log - log	:	$\ln V = \alpha_0 - \alpha_1 \ln TC$	= Double-log

Where:

V = Number of visits per year

TC = Travel cost

α_0, α_1, α_2 = parameters to be estimated

Theoretically, they are equally important i.e. no one of these functional forms is theoretically better than others. There are, however, statistical tests conducted to select one functional form, which can better, estimate the recreation demand model. Furthermore the functional form, which may no longer be helpful to measure welfare in the Poisson model vis-à-vis the specific result of this study, will not be employed. The selection of the specific functional form for this study is discussed in chapter 4.

3.4. Estimation technique

This study is undertaken based on the survey data collected from visitors of Wabi-Shebele Langano recreation site. Potential visitors are excluded from the sample. The dependent variable (visits per year) is truncated at the point where visits per year are greater than or equal to one. An alternative approach is to include the potential visitors and separate respondents' decision process into two parts:

1. Asking potential visitors' decisions whether or not to visit the site.

2. Asking those potential visitors who decided to visit the site how many visits per year they could make to the site.

Having this information, it is legitimate to use two stage estimation techniques such as Generalized tobit, Heckman and Cragg models to approximate the demand function. However, the dependent variable is an integer (visits per year) and these models do not account for the integer nature of the recreation trips variable (Mullahy, 1986).

In this study, the data for the dependent variable (visits per year) are typical of count data (integer). Truncated Poisson regression is, therefore, used to study such count data (Greene, 2000).

Because the data for the dependent variable are integers, truncated below one visit per year, equation estimation by OLS regression is inappropriate. Madalla (1983) showed that the regression slopes estimated by OLS will be biased toward zero 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 obtained for this study are, therefore, estimated using maximum likelihood (ML) estimators.

Since Poisson and negative binomial regression functional forms are equivalent to a 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 suggested by Cameron and Trivedi (1990) in Greene (2000) is the negative binomial regression model.

The negative binomial regression model does not have this shortcoming. However, the negative binomial regression model is not used in this study after the tests for over dispersion (suggested by Cameron and Trivedi, 1990 in Greene (2000) were conducted. These tests showed that over dispersion was not the problem of this data. Thus, truncated Poisson regression model was adopted. The test procedures are attached in appendix IIIA.

The Poisson model is used to represent a simple count data model. As stated in Greene (2000), the Poisson regression model specifies that each V_i is drawn from a Poisson distribution with parameter λ , which is related to the regressors X_i. The primary equation of the model is:

$$\text{Prob}(Y_i=y_i) = \frac{\exp(-\lambda)\,\lambda^{y_i}}{y_i!}, \qquad y_i = 0, 1, 2, 3, - - -$$

Furthermore, the expected number of events per period is given by:

$$E[y_i | x_i] = var[y_i | x_i] = \lambda_i = \exp(\beta' x)$$

Thus, $$\frac{\partial E[y_i | x_i]}{\partial x_i} = \lambda_i \beta$$

With the parameter estimates in hand, this vector can be computed using any data vector desired.

Truncation often arises as a consequence of discarding what appear to be unusable data, such as the zero values in survey data on the number of users of recreation facilities. The zero values in this setting might represent a discrete decision not to visit the site, which is a qualitatively different decision from the positive number for someone who had decided to make at least one visit. As stated in Greene (2000, p. 919), the probabilities in the model with truncation above zero would be:

$$P_i(j) = Prob[y_i = j] = \frac{\exp(-\lambda)\lambda_i^j}{[1 - P_i(0)_j]!} = \frac{\exp(-\lambda_i)\lambda_i^j}{[1 - \exp(-\lambda_i)]_j}, \quad j = 1, 2, \ldots\ldots\ldots$$

CHAPTER 4 EMPIRICAL RESULTS

In this study, a questionnaire was used to collect information on the socio-economic characteristics of visitors of Wabi-Shebele Langano recreation site and their site visits response. The empirical findings of households' characteristics and visitations as well as the regression results and the aggregate benefit estimation are discussed in this chapter.

4.1. Descriptive analysis

4.1.1. Household socio-economic characteristics

The survey data was collected from a sample of 300 visitors of the site where 32 questionnaires were discarded due to incompleteness. During the survey period, it was found that all visitors came from Addis Ababa. The respondents were government employees, NGO workers, businessmen and some students who came to the site with their families. Hence, the responses of 280 visitors were used for this study.

In this sample it was observed that 61.0% of respondents were female while 31.85% of the respondents were married. Of the total respondents, 17.8% were married women while 14% were married men. The rest 68.15% of the respondents were single. It was also observed that 28.77% of the respondents were heads of their household.

TABLE 4.1. DISTRIBUTION OF AGE OF SAMPLE VISITORS

Age group	Frequency	Relative frequency	Cumulative frequency
10-20	4	1.43	1.43
21-30	200	71.43	72.86
31-40	73	26.07	98.93
41-50	3	1.07	100.00
TOTAL	**280**	**100**	

Source: Survey result

As indicated in the above table, 98.93% of visitors were less than 41 years old. Visitors that were less than 21 accounted for 1.43% of sample visitors while 1.07% of the respondents were greater than 40 years old. Furthermore, the mean age of the respondents was 29.22 years.

If we look at the number of visitors in different age groups, we observe that it is increasing up to the 3rd class interval and decreases thereafter. This result is consistent with our intuitive expectation that young people travel to long distances to recreate in recreation sites.

TABLE. 4.2. HOUSEHOLD SIZE OF VISITORS

Household size	Frequency	Relative frequency	Cumulative frequency
1	20	7.1	7.1
2	21	7.5	14.6
3	65	23.2	37.9
4	79	28.2	66.1
5	56	20.0	86.1
6	22	7.9	93.9
7	17	6.1	100.0
TOTAL	**280**	**100**	

Source: Survey result

As can be seen from table 4.2, about 7.1% of sample visitors had no other members in their family. About 14.6% of visitors had no more than 2 members in their family. We see from the table that as the number of members in a family increases, the number of visitors to the site decreased. This suggests that people who had larger family size are less likely to take more visits to the recreation site. The average household size of sample visitors is 3.94.

TABLE 4.3. EDUCATION LEVEL OF SAMPLE VISITORS

Education level (in number of years)	Frequency	Relative frequency	Cumulative frequency
9 – 12	26	9.29	9.29
13-15	121	43.21	52.5
16-18	130	46.43	98.93
>18	3	1.07	100.00
TOTAL	**280**	**100.00**	

Source: Survey result

A good proportion of visitors had education at college or university level. As indicated in the above table, about 90.71% of sample visitors had completed their college or university education. The mean years of education was 15.03 years.

TABLE 4.4. MONTHLY INCOME OF VISITORS IN BIRR

Income range	Frequency	Relative frequency	Cumulative frequency
1000 - 1800	64	22.86	22.86
1801-2600	109	38.93	61.79
2601-3400	33	11.78	73.57
3401-4200	33	11.78	85.35
4201-5000	25	8.93	94.28
5001-5800	4	1.43	95.71
> 6000	12	4.29	100.00
TOTAL	**280**	**100**	

Source: Survey Result

The fact that almost all visitors' monthly income was greater than Birr 1000 demonstrates that relatively high-income groups went to the recreation site.

As shown in the above table 73.57% of sample visitors did earn monthly income ranging between Birr 1000 and 3400. The average monthly income of respondents was Birr 2727.14.

We may also note that in the survey result, it was found that 25.3% of visitors were government employees while 17.3% were employee of non-government organizations and 57.4% ran their own business. It was also observed that almost all visitors came to the site using their own car.

TABLE 4.5. NUMBER OF VISITORS IN A GROUP

Number of visitors in a group	Frequency	Relative frequency	Cumulative Frequency
1	2	0.71	0.71
2	10	3.57	4.28
3	33	11.79	16.07
4	64	22.87	38.94
5	88	31.43	70.37
6	40	14.28	84.65
7	27	9.64	94.29
8	16	5.71	100.00
TOTAL	**280**	**100.00**	

Source: Survey result

Only two visitors (0.71% of sample visitors) were observed traveling alone during the survey period. All 99.29% of sample visitors were traveling in-group. As shown in the above table 4.5 many of the visitors (68.58%) came to the site in-group of 4-6 people.

The average number of persons in a group was 5.08. We see from table 4.5 the number of visits increased as the number of people in a group increased from 1 to 5, and it has a decreasing pattern thereafter.

TABLE 4.6 NUMBER OF YEARS OF ACQUAINTANCE TO THE SITE

Years of acquaintance	Frequency	Relative frequency	Cumulative frequency
0	11	3.93	3.93
1-5	95	33.93	37.86
6-10	112	40.00	77.86
11 –15	55	19.64	97.5
16-20	7	2.5	100.00
TOTAL	**280**	**100.00**	

Source: Survey Result

As revealed in table 4.6, 3.93% of visitors didn't know the site before while 96.07% of respondents had known the site before the survey period. Furthermore 22.14% of sample visitors had known the site for the last 10 years. The average number of years of acquaintance of visitors was 7.24 years.

From the survey result, it was observed that 88% of sample visitors had visited Bekele Mola substitute site for the last 12 months while 11.98% and 10.62% of respondents had visited Bishan Gari and Abule Basuma recreation sites, respectively at least once for the last 12 months.

Visitors of Wabi-Shebele Langano recreation site were asked if they had previously planned to visit the site before they came to the site or not. The survey result showed that more than 90% of visitors had a plan in the previous year to visit the site. However

none of them had come to the site as they planned. According to the reasons they mentioned that 80.03% of them failed to maintain their plan due to money constraint, 12.5% of them were due to leisure time constraint, 5.2% of them were due to remoteness of the site from their origin and the rest were due to other personal problems. In this case, income constraint to visit seems the major factor to visit the site.

Similarly, visitors were asked to reveal their future plan to visit the site. i.e how many more trips are they going to have to visit the site for the next 12 months if their trip cost remains the same. The survey result showed that 90% of the respondents are going to have 2 more additional trips to visit the site for the next 12 months while 7% of them maintain their number of trips and the rest 3% do not know exactly how many trips they are going to have to visit the site for the next 12 months.

Considering their future number of visits plan, the average number of visits for the next 12 months will be 5 visits. Thus, it will be a good indication that the site would have more visits for the next 12 months under the existing travel costs.

4.1.2. Household's response to visitation

The basic assumption of TCM 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 and travel costs per trip are the two crucial elements used to construct the demand curve for out-door recreation on the site.

TABLE 4.7. NUMBER OF ANNUAL VISITS

Number of annual visits	Frequency	Relative frequency	Cumulative frequency
1	18	6.43	6.43
2	156	55.72	62.15
3	66	23.57	85.72
5	27	9.64	95.36
6	13	4.64	100.00
TOTAL	**280**	**100**	**100**

Source: Survey Result

As indicated in table 4.7, 62.15% of sample visitors have visited the site 2 times for the last 12 months. The results also show that 79.29% of them visited the site 2 or 3 times during this period. The average number of annual visits to the site was estimated at 2.64 visits.

TABLE 4.8.VISITORS' TRAVEL COSTS PER PERSON PER ROUND TRIP

Travel cost per round trip	Frequency	Relative frequency	Cumulative frequency
175-300	41	14.64	14.64
301-500	63	22.50	37.14
501-600	155	55.36	92.50
601-700	3	1.07	93.57
701-800	5	1.79	95.36
>800	13	4.64	100.00
TOTAL	**280**	**100.00**	

Source: Survey result

As shown in table 4.8, about 92.50% of sample visitors spent Birr 501-600 to recreate on the site. Travel cost per round trip consists of both mileage and time costs. Mileage costs include fuel costs and other special costs that people may incur associated with

trip (e.g., insurance costs, car spare part costs, money spent on food, drinks, etc. in connection with trip when people travel to get into the site). Time costs are measured by the opportunity cost of time spent on site, which, in this study, is obtained by asking visitors how much they would be willing to be paid by any economic agent if they were requested to cancel their visitations. The minimum round trip travel cost was Birr 175 and the maximum was Birr 980. The average round trip travel cost was Birr 502.836.

Furthermore, visitors were asked to allocate their enjoyment into travel and on-site experiences. The average time spent on site was 79.11% of the total time spent out of home when they travel while 20.89% of their total time of trip was attributed to their journey. This was a good clue/manifestation that most of the respondents were pure visitors. (See tables 4.9 and 4.10).

TABLE 4.9. TOTAL TIME SPENT BY VISITORS OUT OF HOME AND ON SITE

Time Spent (hrs)	Out-of-home frequency	Cumulative frequency	On-site frequency	Cumulative frequency
< 10	0	0	1	0.36
10-15	0	0	23	8.57
16-20	17	6.07	18	15.00
21-25	20	13.21	3	16.07
26-30	23	21.43	68	40.36
31-35	27	31.07	88	71.78
36-40	101	67.14	54	91.07
41-45	63	89.64	25	100.00
>45	29	100.00	0	100.00
TOTAL	**280**		**280**	

Source: Survey Result

As can be seen from table 4.9, 83.93% of visitors spent more than 25 hours on site. The average time that visitors spent out of home was 39.1 hours.

TABLE 4.10: RECREATION EXPERIENCE ATTRIBUTED TO THE SITE AND JOURNEY (RATIO OF TIME SPENT ON SITE TO TOTAL TRIP TIME OUT OF HOME PERCENT)

REXATTJ (%)	Frequency	Cum. Frequency	REXATTS (%)	Freq.	Cum. freq.
10-15	20	7.14	<75	25	8.93
16-20	180	71.43	75-79	65	32.14
21-25	54	90.71	80-84	170	92.86
>25	26	100.00	85-90	20	100.00
TOTAL	**280**		**TOTAL**	**280**	

Source: Survey Result

Where:

REXATTS: Recreation Experience attributed to Journey.

REXATTJ: Recreation Experience attributed to Site.

As can be seen from table 4.10, 83.93% of sample visitors explained that more than 75% of their total recreation enjoyment was attributed to their on-site recreation experiences. On the other hand, the same number of visitors showed that less than 20% of their total recreation enjoyment was due to their journey experiences. The average total time that a visitor spent on site was 79.11%. Hence, in this study, respondents were not meanderers; they were pure visitors, as it could be understood from their allocation of time to their total recreation enjoyment on the site.

Regarding the importance of recreation activities during the trip, recreationists were asked to rate 5 major recreation activities using a scale from one to five where one was

most important and five was least important. The results of this survey question are shown in table 4.11.

TABLE4.11. IMPORTANCE OF RECREATION ACTIVITIES DURING THE OUTDOOR RECREATION TRIP.

Type of Recreation activity	Number of recreationists responding to the question out of 268 surveyed visitors	Percent	Rates (1= most important, 5= least important)
Enjoyment from beautiful weather, scenery of the lake & land escape.	223	83.22%	1
Swimming in the lake	24	8.57%	2
Boating	13	4.64%	3
Outdoor game facilities	7	2.50%	4
Bird watching & photographing	3	1.07%	5

Source: Survey Result

The response rate may be a good indicator of recreationist's interest in different types of recreation activities. The activity with the highest rating was enjoyment from beautiful weather, scenery of the lake and land escape, more than 80% of the visitors preferred this recreation activity.

4.2 Regression Results and Benefit Estimation

As noted earlier, the recreation demand function is approximated using the number of visits to the site as dependent variable and the travel cost associated with the trip and other socio-economic characteristics as independent variables.

The truncated Poisson model is used to estimate the demand function since the dependent variable has only integral values and the values are greater than or equal to one (truncation).

$$LnV = \alpha_0 + \alpha_1 TC + \alpha_2 AG + \alpha_3 Y + \alpha_4 FZ + \alpha_5 ED + \alpha_6 AQ + \alpha_7 GP + \alpha_8 DGD + \alpha_9 DMS + \alpha_{10} DPC + \alpha_{11} DHD + \alpha_{12} DOC + \alpha_{13} DBMSS + \alpha_{14} DBGSS + \alpha_{15} DABSS + \varepsilon_i$$

Where:

V= Individuals' number of visits.

TC = visitors' travel cost.

AG = visitors' age.

Y = visitors' monthly income.

FZ = visitors' family size.

ED = visitors' level of education as dummy variable (1 for number of years>12 and 0 for<=12)

AQ = visitors' acquaintance with the site in number of years.

DGD = visitors' gender as dummy variable. (1 for male, 0 for female)

DMS = visitors' marital status as dummy variable. (1 for married, 0 otherwise)

GP = number of visitors in a group.

DPC = visitors' mode of transport (1 for own car, 0 otherwise).

DHD = visitors as head of the family (1 for head of the family, 0 otherwise)

DOC = visitors' occupation as dummy variable. (1 for government employee, 0 otherwise)

DBMSS = Bekele Mola Substitute site as dummy variable (1 for visits to BMSS, 0 otherwise)

DBGSS= Bishan Gari Substitute site as dummy variable (1 for visits to BGSS, 0 otherwise).

DABSS = Abule Basuma substitute site as dummy variable (1 for visits to ABSS , 0 otherwise).

ε_i = Error term

The area under the site demand curve represents the economic benefits that flow annually to visitors of the recreation site.

The regression results obtained from this model are estimated using ML estimator. As noted earlier, this is because OLS estimation results in biased estimation for truncated cases. The robust regression results of the truncated Poisson model are displayed in table 4.12 below.

TABLE 4.12.MAXIMUM LIKELIHOOD REGRESSION RESULTS

Variables	Truncated Poisson Coefficients	Marginal effects	Mean Values
Travel cost	-0.002272*** (-5.963)	-0.0045151	500.43929
Income	0.000049* (1.957)	0.0000988	2733.571400
Education	-0.038526*** (-2.875)	-0.0765456	0.907142
Family size	-0.067872*** (-3.442)	-0.1348498	3.925000
Acquaintance	0.012677*** (4.142)	0.0251877	7.253571
Group	0.002435 (1.372)	0.0048384	5.0928571
Age	-0.013586*** (-3.705)	-0.0269932	29.185714
Head of the family	-0.028230** (-1.973)	-0.0560899	0.296428
Marital status	0.017514 (0.790)	0.0347985	0.328571
Occupation	0.007998 (0.553)	0.0158919	0.285714
Gender	0.026755 (1.553)	0.0531586	0.396428
Abule Basuma site	-0.051008*** (-2.711)	-0.1013443	0.121428
Bishangari site	0.022230 (1.559)	0.0443313	0.171428
Bekele Mola site	0.209090*** (3.249)	0.4154250	0.900000
Constant	2.082006 (8.126)	4.1365752	N/A
ML Results Unrestricted Log Likelihood = -350.1943 Restricted Log Likelihood (α=0) = -460.4674 R^2 =0.9665 Number of observations = 268			

*** 1 percent level of significance
** 5 percent level of significance
* 10 percent level of significance
Numbers in parenthesis are t-values.
N/A=Not available

Age square was entered in the regression analysis to test the linearity relationship of age with the dependent variable. The regression result showed that age is linearly related with number of visits and age square was found to be insignificant.

The log-likelihood ratio (LR) can be used to test the significance of the model (Greene, 2000).

$$LR = -2(\text{Restricted Log} - \text{Unrestricted Log L})$$

In this case, the unrestricted log likelihood is –350.1943 and the restricted log likelihood is –460.4674.Thus, LR is equal to 220.5462

.

However, at 1% significance level, the table (critical) value of the test with 15 degrees of freedom (χ^2_{15}) is 32.80.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. Tests for over dispersion using the negative binomial model indicate that there is no over dispersion.

4.2.1 Demand Estimation

The regression results are presented in table 4.12. The results indicate that travel cost (TC) has a negative and significant impact on the demand for visits to Wabi Shebele Langano recreation site, as expected. In particular, the results show that, ceteris paribus, the demand for visits to Wabi Shebele Langano recreation site would decrease

by 1 unit if visitor's travel cost increased by Birr 222.22 (USD25.84). Similarly, visitors' income (Y) has a positive and significant influence on the demand for visits to the site. In particular, the number of visits would increase by 1 unit when visitor's income increases by Birr 10204.08 (USD 1186.52), ceteris paribus.

Furthermore, visitors' acquaintances with Wabi-Shebele Langano recreation site (AQ) and Bekele Mola recreation site have a positive and significant influence on the demand for visits, as expected. The coefficient of the dummy variable for Bekele Mola site is positive and significant suggesting that those who visit Bekele Mola site are more likely to visit Wabi-Shebele langano recreation site, other things remaining the same.

Family size (FZ), age (AG), level of education (ED) and being the head of the family (HD) are found to have a negative and significant effect. Similarly, Abule Basuma recreation site (ABSS) is found to have a negative and significant effect. Note that all variables but level of education and Abule Basuma recreation site have the expected signs, as discussed in chapter 3.

The negative sign of the coefficient of the dummy variable for Abule Basuma (ABSS) suggests that those who had visited Abule Basuma recreation site are less likely to visit Wabi-Shebele Langano recreation site, other things remaining the same.

The negative sign of the coefficient of education variable suggests that less educated people (primary and secondary school) visit the site more frequently than educated ones (above secondary education). Perhaps this result may need further investigation.

Other explanatory variables such as occupation of visitors (OC), gender (GD), and marital status (MS) are found to be insignificant determinants of visits to Wabi-Shebele Langano recreation site. Moreover, the variable mode of transport (PC) was taken out as almost all visitors used their own private vehicle to go to the site.

Though the extent of significance of these variables differs from one study to the other, many of these variables are found in several TCM studies as principal factors affecting the demand for visits to a recreation site. The results obtained in this research are also consistent with other studies in similar areas e.g., see Shrestha et.al(2002), Taylor(2000).

4.2.2. Demand function and recreational benefit estimation

The demand function for visits to Wabi Shebele Langano recreation site is constructed by relating visitors' travel costs (TC) with their number of visits to Wabi-Shebele Langano recreation site (V). The exponential function is selected in this study as the benefit estimates from the power function are not defined (See Appendix IIIB)

The typical linear semi-log travel cost model hypothesis is:

$$LnV_{ij} = \alpha_0 - \alpha_1 TC_i + \varepsilon_i \text{ ----------4.1}$$

Where:

V_{ij}= individual i's annual visits to site j.

TC_i =individual i's travel cost

α_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.

ε_i =residual assumed to be normally distributed $(0, \sigma^2)$,

with mean=0 , and variance=σ^2

The demand function estimated for visitation to Wabi Shebele Langano recreation site is stated as follows:

$$\ln V_{ij} = 1.77421 - 0.00227\ TC_i \quad \text{---------- 4.2}$$

Per person annual recreational benefit of Wabi Shebele Langano Recreation site is estimated by calculating the area under the demand curve. This area is calculated by transforming equation (4.2) into an exponential function and integrating the inverse demand function between 0 and the average number of visits, which was estimated at Birr 1760.8 (USD 204.74) for the average number of visits. The recreational benefit of the site per visit per person was, therefore, estimated at Birr 950.52 (USD 110.52).

In a survey questionnaire, respondents can be directly asked to put what percent of their recreation experiences are attributed to their on-site and off-site experiences. The response is used to estimate how much of the utility of the whole recreational experience belongs to the on-site experience (Willis and Garrod, 1991).

In this study, a similar technique is used to evaluate how much of visitors' utility of the whole recreational experience is due to the on-site experience. Visitors were directly asked to apportion their total recreation experience/enjoyment into their on-site enjoyment and travel experience. The results show that 79.11% of their total recreational experience was due to on-site experience.

Hence, individual on-site recreational benefit is approximated to 79.11% of his/her annual recreational benefit from Wabi-Shebele Langano recreation site. Thus, on-site recreational benefit per visit per person was estimated as follows.

79.11% x Birr 950.52 =Birr 751.95(USD 87.43)

Now, considering the annual sales report of Wabi Shebele Langano recreation site, the total number of visits to the site for the 12-month period before the survey was 11,551. Then, the estimated individual recreational benefit per visit per person can be translated into total annual on-site recreational benefit as follows:

Birr 751.95 x 11,551 = Birr 8,685,774 (USD 1,009,974)

Therefore, the total annual on-site recreational benefit of the site was estimated to be Birr 8,685,774(USD 1,009,974)

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 of Birr 510. Thus, individual consumer surplus (CS) per visit was approximated to Birr 440.52 (USD 51.16)

This consumer surplus per visit can be translated into aggregate consumer surplus for the total number of 11551 visits for the 12-month period before the survey, which was approximated to Birr 5,082,440 (USD 590,981.39)

CHAPTER 5 CONCLUSIONS AND RECOMMENDATIONS

Not surprisingly, economic values of recreation sites, national parks and other natural resources in Ethiopia are not properly examined with appropriate and well-defined scientific approaches. The quality of these resources is therefore deteriorating due to lack of proper management of resources. Poor resource management occurs, among other things, due to absence of estimated value of resources. If there is no proxy of economic value of natural resources, it is apparently difficult to generate sustainable revenue from internal sources to support the endeavor to be made towards the improvement and expansion of quality of such resources.

The major objective of this study is to estimate the economic value of an outdoor recreation site. Though there are problems of getting accurate and dependable data in the process of estimation of the value of natural resources, it is practically manageable to put monetary values on outdoor recreation. Then, such monetary valuation can be useful for sound resource planning.

Thus, the study attempted to provide a monetary estimate of the use value of Wabi-Shebele Langano recreation site. For this purpose, an environmental technique of valuation for outdoor recreation, travel cost method, was employed.

The travel cost method particularly requires having accurate information of travel costs. Measures of travel costs consist of distance cost and travel time costs, i.e., the amount

of money and time that visitors are willing to spend getting to and staying on the recreation site.

Since the data for the dependent variable (visits per year) are count data (integer), count data models were used. The dependent variable is truncated at a point where number of visits is greater than or equal to 1. Furthermore the statistical test showed that the data has no over dispersion problem. Thus, the truncated Poisson model was used in the empirical analysis instead of the negative binomial model.

The regression results obtained from this study showed that travel costs, visitor's income, acquaintance with the site, family size, age, level of education, being a head of the family, availability of Bekele Mola and Abule Basuma 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, as would be expected. Similarly, the coefficient of income variable is positive and significant implying that the demand for recreation increases as visitor's income increases.

The results also suggest that visitors' on-site time increased as the number of visits increased. This is an indication that the greater the time available to spend on recreation site the greater the demand for the recreation site. The relationship between education variable and recreation demand was negative and significant implying that the less

educated people make more frequent visit than more educated ones. All other variables are found as expected and they can be interpreted as discussed in chapter 3.

Furthermore the recreational benefit computed from the regression analysis indicated that the on-site recreational benefits per visit amounted to Birr 751.95 (USD 87.43). The expected total annual benefit of the site was, therefore, estimated at Birr 8,685,774 (USD1, 009,974).

The result of this study indicates that the benefit of visitors from the site is larger than the annual income that the site management earned from visitors of the site, as would generally be expected. Based on these results of the study, it is, therefore, legitimate to draw the following policy recommendations.

According to this study, the site management was able to capture only about 20.87% of the true economic recreational benefit of the site for the 12-month period before the survey. This implies that the amount of revenue that the site authorities collected from the service is far from the true economic recreational benefit of the site.

If we compare the true economic recreational benefit of the site and the actual revenue collected by the site authorities, it may be possible to further augment the actual revenue collected from the site, which could again possibly be reinvested to improve the quality and the conservation benefit of the site.

Consequently, site authorities and other concerned bodies need to be aware that there may be a possible danger of underestimation of the conservation benefit of the site if

future economic decision of managing this resource fails to properly consider the true recreational benefit of the site. Failure to properly internalize as much of the true benefit of the site for conservation and improvement of the quality of the site may lead to possible occurrence of an irreversible damage on the natural resources of the site.

This research attempted to measure the on-site recreational benefit of Wabi-Shebele Langano recreation site. It is only one component of the total economic benefit of the site. The total economic value of the site also includes other use values of the site (such as option value and quasi-option value) and non-use values of the site (such as bequest value and existence value).

The total economic value of the site requires an effort of attaching a monetary value to all these values of the site. Therefore, it is advisable if site authorities or other concerned bodies (e.g., Environmental Protection Agency) encourage research to estimate the total economic value of the site.

Policy makers and decision makers need to have strong idea about economic values of environmental resources before they plan to launch similar projects. By any measure, decision on allocation of environmental resources would be appropriate if it is based on an economic estimate obtained through accepted estimation techniques than valuing resources on the basis of peoples' traditional value judgment. It would, therefore, be of great importance if environmental authorities base their future economic decisions on the economic value of these resources estimated using environmental valuation techniques.

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APPENDIX I

QUESTIONNAIRE

Date ----------

Interviewer code ----------

Interview started ----------

Interview ended ----------

Interviewee number ----------

Supervisor **----------**

Thank you for giving me your time. My name is Sitotaw Enyew. I am a student from A.A.U. This survey aims to obtain information from Wabi-Shebele Langano recreation area visitors and local residents on uses of the site and their opinions about their visitations. It is essential that we obtain accurate information from your responses.

Your views could be used to help policy makers make conscious decisions about the site. Some questions are designed to draw some historical information from your experience; and some will require your attitudes and opinion. There are no “right” or “wrong” answers. All your answers will be treated in strict confidence. Your name will not be related with your answers. Thank you for your cooperation.

All your responses for the following important questions are used for pure academic research purpose. Please be assured that all the information that you give will be managed in strict confidence.

Part I

Respondents' Personal Data

Name _____

Place of residence: where do you live _____ (since_____ E.C.)

OR. From which place did you come to visit Wabi-Shebele Langano recreation site?

County_____

Region----------

City ----------

How many kms is your residence from Wabi-Shebele Langano recreation site?

----------Kms.

4. Gender 1 Male 2 Female

5. Marital status 1 Single 2 Married 3 Divorced /Separated

4 Other (eg. Cohabitation-live together with out formal marriage)please specify _____

6. Age _____ **years**

7. Attendance of formal education; _____**years**

8. Occupation

1.Government employee

2.Non-Governmental organization employee

Domestic private sector employee

Foreign company employee

3.Own business

4.Student

5.Unemployed

6.Other (please specify_____)

9. Family size: what is the number of people in your family?

No. of adults (age≥ 18)

No.of children (age < 18)

10. Are you the head of the household?

1.Yes

2.No

11. Gross income: what is your own gross income? From :

1.Employment _____ Birr per _____(day, week, month, year)

2.Business_____ Birr per_____(day, week, month, year)

3.Other sources _____Birr per _____(day, week, month, year) (eg. House rent, Bank interest, including pocket money from parents, relatives, friends etc) please specify_____

11.1 What is the minimum wage/hour? ----------Birr/hour

12 How many people in your family (including yourself) earn their own income? (Either from employment or business)----------

Please list family income (specify daily/weekly/ monthly/annually)

Household member	Income from business	Income from Employment	Income from other sources (please specify)

Part II

Respondents' opinion on the site & their visitations

The purpose of the following questions is to know respondents attitude towards Wabi-Shebele Langano recreation site, which will be useful to gather historical data about your visitation

When did you arrive at Wabi-Shebele Langano recreation site this time? (Day---- Month----- year----E.C.)

2.Did you come to the site alone or in-group? a. Alone b. In-group.

If you came in group:

2.1.How many people are in your group**? ----------People**

2.2.Did you come to the site by your motivation? 1.Yes 2.No

2.3.With whom did you come to the site? (Specify as friends, wife, husband, families others, etc)

Relationship	No. of Adults (.18)	No. of children (,18)
Family Friends Relatives Work colleagues Other(Please Specify)----------		

3. How long will you stay on the site? _____ days. (From arrival to departure)

4. If you were not on this trip today, what would you most likely be doing?

1.Working at job

2.Housework or shopping

3.Other

4.1.How much did you ask your institution to pay you if you were asked to be at your job this time?--------Birr/hour

5.When did you know about Wabi-Shebele Langano recreation site**? --------Years**

5.1.How many years have you recreated on Wabi-Shebele Langano recreation site?

----------Years.

5.2. How many trips did you plan to take to the Wabi-Shebele Langano recreation site during the last 12 months?----------**trips**

5.3.How many recreation trips to the Wabi-Shebele Langano recreation site did you take during the last 12 months? **----------trips.**

5.4.Is there a difference between the number of trips you planned to take to Wabi-Shebele Langano recreation site and the actual trips you took during the last 12 months ?

1.Yes 2.No

If yes, what do you think the cause of this difference?

1.due to income constraint.

2.due to leisure time constraint

3.due to remoteness of the site deterioration of services at this site

4. due to deterioration of services at this site

5.due to preference of other similar sites

6.Other reasons (please specify)---------

5.5.How many trips would you plan to take to Wabi-Shebele Langano recreation site in the next 12 months? ----------**trips.**

5.6.Do you think that you would take more trips in the next 12 months than the trips you took before to Wabi-Shebele Langano recreation site?

1.Yes 2.No

If you answered yes to question 5.6:

5.7.How many more trips would you plan to take to Wabi-Shebele Langano recreation site in the next 12 months? **----------more trips**

6.What was the time of your most recent recreation trips to the Wabi-Shebele Langano recreation site during the last 12 months?

Feb 2002 - May 2002 **----------times**

June 2002 - August 2002 **----------times**

Sept 2002 – Nov 2002 **----------times**

Dec 2002 - Jan 2003 **----------times**

7.Which days do you frequently come to this site?

1.Working days (Monday – Friday)

2.Weekends (Saturday &Sunday)

3.Public holidays

8. Have you visited other similar sites before?

1.No

2.Yes

9. If yes, which sites did you visit?(Please rank your preference of these recreation sites)

Name	Rank
Bishan Gari	
Bekele Mola	
Abule Basuma Others (please specify)----------	

10 In your trip this time, which site would you visit if you were asked to visit only one of these sites?(i.e.which site would be your first choice?)

1.Wabi-Shebele Langano recreation site.

2.Bekele Mola recreation site

3.Bishan Gari recreation site

4.Abule Basuma recreation site

11.What is the percent of your total enjoyment to hese recreation sites?(Please make sure that your responses add to 100%)

Percent

1.Wabi-Shebele Langano recreation site ----------

2.Bekele Mola recreation site ----------

3.Bisha Gari recreation site ----------

4..Abule Basuma recreation site ----------

5.Others(Please make sure that your responses add to 100%) ----------

TOTAL 100%

1. Yes 2. No 3. Indifferent

12. How many times have you ever visited each of the following sites during the last 12 months?

Name	No. Of Visits
1. Wabi-Shebele Langano recreation site	
2. Bekele Mola recreation site	
3. Bishan Gari recreation site	
4. Abule Basuma 5. Others (please specify)----------	

12.1.Typically, how many days per year are you on recreation trips to Wabi-Shebele Langano recreation site? **--------days per year.**

12.2.Typically, how many days per year are you on recreation trip to similar places other than Wabi-Shebele Langano recreation site? **----------days per year.**

12.3 Typically, how many recreation trips per year do you take to Wabi-Shebele Langano recreation site? ---------- **trips per year**

12.4 What is the one-way distance from your home/residence to your most preferred alternative recreation site if you didn't recreate in Wabi-Shibele Langano recreation site? ------**Kms one-way**

13. What percent of your enjoyment on the site would you assign to each of the following recreation activities in Wabi-Shebele Langano recreation site (please make sure that your responses add to 100%)

1.Swimming in the lake ----------

2.Enjoyment from beautiful weather, scenery of the lake & landscape ----------

3.Out door games facilities ----------

4.Boating ----------

5.Bird watching & photographing ----------

13.1 Please rank the importance of the following recreational activities.

1. Swimming in the lake ----------

2.Enjoyment from beautiful weather, scenery of the lake & landscape ----------

3.Out door games facilities ---------

4.Boating ---------

5.Bird watching & photographing ----------

14. Which mode of transport did you use to & from Wabi-Shebele Langano recreation site? (Please circle the mode of transport you used)

1.Own vehicle private car

2.Public transport

3.NTO or other travel agents' vehicle

4.Others (please specify)

15. What is the amount of cost you incurred for transport in question (13) above please specify money expenditure on fuel or tariff per round trip. Birr ----------

16. How many kms do you usually travel to and from Wabi-shebele Langano recreation site? _____ Kms

17.. How many hours do you usually travel to and from Wabi-Shebele Langano recreation site? _____**hours**

18.How many hours do you usually stay on the site? _____**hours**.

19.What percent of your total recreation experience can be attributed to each of the following? (Please make sure your responses add to 100%)

1.Journey to and from the site ---------%

2.Recreation on the site ---------%

20.What percent of your total recreation experience can be attributed to each of the following? (Please make sure that your responces add to 100%.)

1.Journey to and from the site----------%

2.Recreation on the site ----------%

Total 100%

21. How many days per year are you free from other obligations so that you could undertake recreation? -------**days per year.**

21.1. How many days of vacation, excluding weekends, do you typically take each year? ----------**days per year.**

22. What is your total time (hours) away from home on a typical trip to Wabi-Shebele Langano recreation site? ------- **hours**

23. What is the typical total cost to you of a trip to the Wabi Shebele Langano recreation site including round rip transportation, equipment, supplies, food, accommodations, entertainment, etc.? **Birr ---------cost to you**.

24.Total cost incurred at other sites if you do not spend your time at Wabi-Shebele Langano recreation site? **Birr----------cost to you.**

APPENDIX: II

Table A: Correlation Matrix

	AV	*TC*	*Y*	*AG*	*FZ*	*ED*	*AQ*	*GD*	*MS*	*GP*	*HD*	*OC*	*BMSS*	*BGSS*	*ABSS*
AV	1.00														
TC	-0.90	1.00													
Y	0.98	-0.87	1.00												
AG	-0.14	0.03	-0.11	1.00											
FZ	-0.86	0.87	-0.84	0.09	1.00										
ED	-0.24	0.23	-0.23	0.19	0.16	1.00									
AQ	0.07	-0.22	0.07	0.54	-0.16	-0.03	1.00								
GD	-0.02	0.02	-0.02	0.54	0.00	0.06	0.41	1.00							
MS	-0.16	0.08	-0.14	0.58	0.13	0.07	0.32	0.03	1.00						
GP	-0.01	0.03	-0.02	-0.06	0.04	0.03	-0.01	0.02	-0.12	1.00					
HD	-0.07	0.09	-0.07	0.41	0.06	0.16	0.26	0.45	0.16	0.06	1.00				
OC	-0.07	0.04	-0.06	-0.05	-0.07	0.15	-0.09	-0.09	-0.04	-0.02	-0.05	1.00			
BMSS	0.26	-0.40	0.23	-0.13	-0.34	-0.09	0.26	-0.04	-0.13	0.05	-0.16	-0.02	1.00		
BGSS	0.53	-0.39	0.50	-0.17	-0.42	-0.12	0.02	0.06	-0.24	-0.02	0.00	-0.16	0.14	1.00	
ABSS	0.14	-0.08	0.16	-0.06	-0.10	-0.09	-0.01	-0.02	-0.07	-0.03	-0.12	-0.21	0.01	0.22	1.00

TABLE B: REGRESSION RESULTS FOR LINEAR, SEMI-LOG AND LOG-LOG

Variables	OLS Coefficients	Semi-log [a] Poisson Coefficients	Log-log [b] Truncated Poisson coefficients
Travel cost	-0.147694*** (0.000282)	-0.001165*** (0.000164)	-0.531765*** (0.156996)
Income	0.124252*** (0.000364)	0.000108*** (0.000014)	0.600263*** (0.133860)
Group	0.02762 (0.019243)	0.001417 (0.001012)	-0.000309 (0.022116)
Family size	0.026853*** (0.011862)	-0.041261*** (0.008632)	-0.072953** (0.035505)
Acquaintance	0.008647** (0.020183)	0.003281** (0.0.001279)	0.113262*** (0.028751)
Education	0.0099818* (0.051371)	-0.032933*** (0.009589)	-0.018006 (0.018744)
Age	0.003254*** (0.011582)	-0.005412*** (0.001481)	-0.177300** (0.086789)
Marital Status	0.009224 (0.138001)	0.003876 (0.011253)	-0.001303 (0.020168)
Occupation	-0.223327 (0.080642)	-0.007475 (0.007997)	0.024094 (0.016231)
Gender	0.010141 (0.100813)	0.0085136 (0.010861)	0.006858 (0.018463)
Head	0.008223 (0.014110)	--0.005772 (0.009700)	-0.039381)** (0.019134)
Bekele Mola site	0.0558*** (0.067310)	0.046356*** (0.017062)	0.230372*** (0.085538)
Abule Basuma site	-0.0562*** (0.517301)	0.036327*** (0.012631)	-0.831717*** (0.028245)
Bishangari site	0.1100*** (0.527736)	0.042570*** (0.011704)	0.013420 (0.018596)

*** 1% significance level
** 5% significance level
* 10% significance level
Numbers in parenthesis are standard errors

[a] only the dependent variable is in log form.

[b] only the dummy variables are not in log form.

TABLE C: REGRESSION RESULTS FOR SEMI-LOG WHERE TIME COST WAS ESTIMATED USING 2⎪3 OF VISITORS WAGE.

	Truncated Poisson coefficients	Marginal Effects	Mean Values.
Travel cost	-0.000211** (0.000056)	0.000732	567.33002
Income	0.000097** (0.000012)	0.000337	2738.8489
Family size	0.013858 (0.012669)	0.048046	3.9208633
Acquaintance	0.012669** (0.00428424)	0.038420	7.2517986
Group	0.003059 (0.0018786)	0.010606	5.0935252
Age	-0.018803)** (0.004877)	-0.651916	29.205036
Education	-0.042180 (0.331086)	-0.146241	0.90647482
Head	-0.03207661 (0.030169)	-0.111209	0.29496403
Marital status	-0.006049 (0.006049)	-0.020975	0.29496403
Occupation	-0.016570 (0.025987)	-0.574512	0.28776978
Gender	0.059521* (0.026717)	0.206360	0.39568345
AbuleBasuma site	0.052740* (0.023423)	0.182851	0.11870504
Bishangari site	0.086088)** (0.025410)	0.182851	0.17266187
Bekele Mola site	0.154084* (0.058048)	0.534209	0.17266187
Constant	1.422798930 (0.164511)	4.932847	N/A

* * 1% significance level

* 5% significance level

Numbers in parentheses are standard errors

N/A Not available

APPENDIX III

A) TESTS OF OVER DISPERSION

Truncated Poisson or truncated negative binomial regression is appropriate for truncated dependent variable with count data (integer) (Greene (2000). However, the significance of the coefficients in a Poisson regression can be greatly overstated if the variance of the dependent variable is not equal to its mean (over dispersion). The following tests for over dispersion developed by Cameron and Trivedi (1990) in Greene (2000) were conducted. A simple procedure used for testing the hypothesis:

H_0: Var (Vi) = E(Vi)

H_1: Var (Vi) = E(Vi) + α E(Vi)

The Poisson model assumption is that H_0 is true and the negative binomial model implies that H_o is not true. E(Vi) estimated from the model was 0.0063 and var (Vi) was 0.0064. The Poisson model assumption that Var(vi)/E(Vi) = 1 is not violated. i.e. H_0 is not rejected. Furthermore, a simple test of whether the coefficient is significantly different from zero tests H_0 versus H_1. The t-statistic for the two regressions are 0.7542 and 0.9612, respectively.

Thus, we reject H_0. The t-values found in the truncated negative binomial model were greater than in the Poisson regression model. This implies that we reject the statement,

which says the coefficient (α) is significantly different from zero. This result was further evidence that Poisson model had no over dispersion in this data. Therefore, the Poisson regression can be used in this study because it was tested that over dispersion was not the problem of this data.

B) BENEFIT MEASURES USING POWER FUNCTION

As Haab and McConnell (2002) noted consumer surplus for access to a recreation site, in the Poisson model with a power function is obtained as follows:

$$WTP(access) = \int_{TC}^{\infty} k_{TC}^{\alpha_1} \, d_{TC}$$

$$= \frac{K_{TC}^{\alpha_{1+1}}}{1+\alpha_1} \quad \text{if } 1+\alpha_1 < 0$$

If $1+ \alpha 1 \geq 0$, the integral does not converge and consumer surplus is not defined. Looking at the results in column 4 of Appendix II, we observe that, using the coefficient of TC (log-log truncated Poisson coefficient), $1+\alpha 1=0.468235$.

This justifies that consumer surplus is not defined. In other words, given the functional form, it implies that the log-log model is implausible (Haab and McConnell 2002). Therefore, the power function becomes irrelevant to this study and the exponential function is selected as an appropriate model for this study.