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SCHOOL OF GRADUATE STUDIES

ESTIMATING THE ECONOMIC VALUE OF ECOTOURISM AREAS: A CASE STUDY OF AWASH NATIONAL PARK, ETHIOPIA

BY

YIDNEKACHEW ASHIM

January, 2018

Addis Ababa, Ethiopia

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A THESIS SUBMITTED TO SCHOOL OF POST GRADUATE STUDIES (INSTITUTE OF AGRICULTURE AND DEVELOPMENT STUDIES) ST. MARY'S UNIVERSITY, IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE MASTERS OF ARTS IN DEVELOPMENT ECONOMICS

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DECLARATION

I, Yidnekachew Ashim, declare that this thesis is my original work, prepared under the guidance of Maru Shete (PhD and Assoc. Prof.). All sources of materials used for the thesis have been duly acknowledged. I further confirm that the thesis has not been submitted either in part or in full to any other higher learning institution for the purpose of earning any degree.

_____ _____

Name Signature

St. Mary's University, Addis Ababa

January, 2018

LETTER OF CERTIFICATION

This is to certify that Yidnekachew Ashim has carried out this project work on the topic ‘estimating the economic value of ecotourism areas: a case study of awash national park, Ethiopia.’ This work is original and suitable for the submission in partial fulfillment of the award of Master Degree in Development Economics.

_____ _____

Research Advisor Signature

St. Mary’s University, Addis Ababa
January, 2018

APPROVED BY BOARD OF EXAMINERS

As a member of the board of examiner of the master thesis open defense examination, we certify that we have read and evaluated the thesis prepared by Yidnekachew Ashim and examined the candidate. We recommended that this thesis be accepted as fulfilling the thesis requirement for the degree of masters of art in Development Economics.

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Dean, Graduate Studies	**Signature**
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Advisor	**Signature**
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External Examiner	**Signature**
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Internal Examiner	**Signature**

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LIST OF ACRONYMS

ABM	Attribute-Based Methods
ASC	Alternative Specific Constant
ANP	Awash National Park
ASLNP	Abijata Shala Lake National Park
CE	Choice Experiment
CEM	Choice Experiment Method
CS	Consumer Surplus
CVM	Contingent Valuation Methods
ETB	Ethiopian Birr
EWCA	Ethiopian Wildlife Conservation Authority
IIA	Independence of Irrelevant Alternatives
IID	Independently and Identically Distributed
ITCM	Individual Travel Cost Method
ML	Maximum Likelihood
MNL	Multinomial Logit Model
MWTP	Marginal Willing to Pay
NNP	Nechisar National Park
NOAA	National Oceanic and Atmospheric Administration
OLS	Ordinary Least Square
RPL	Random Parameter Logit
SMNP	Simen Mountain National Park
WTP	Willingness to Pay
WTTC	World Travel and Tourism Council
ZTCM	Zonal Travel Cost Method

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ABSTRACT

Awash National Park is one of nature-based recreational sites in Ethiopia for its impressive landscape and diversity of fauna. But this park has been in danger due to heavy settlement by farmers, declining numbers of wildlife population, widespread deforestation and continuous reduction in recreational qualities of the site. Furthermore, the site has been unable to improve the qualities of ecotourism experience and expand the types and variety of its recreational services for a long time because of lack of sustainable income from internal sources. Moreover, the value of the park in terms of its recreational service to the society is not known. Thus, there is a need for valuation of the park to know how much value the people attach to the park so as to demonstrate how the site managers can extract revenue so as to improve the qualities of the national park and expand the types and variety of the services. These in turn enables to establish a sustainable and efficient level of operations for the maintenance of the park. In doing so, to attach quantitative estimates to the on-site recreational benefit of the park, the study applied two standard procedures of Environmental Economics, i.e. travel cost and choice experiment methods, using primary data collected from a survey of 195 on-site visitors at Awash National park.

By applying the Travel Cost Method the study estimated the demand function for the site using the amount of money and time people spent in getting to the site, which in turn was used to calculate recreational benefits associated with the site. Accordingly, the expected aggregate annual recreational economic benefit gained by visitors of the site is estimated at ETB 4,987,965.14 out of which the site authority capture only about 12.1% of the true economic recreational benefit of the site. On the other hand, the Choice Experiment Method was used to estimate the value of improvement of the site's quality in terms of the attributes selected (namely; wildlife population, afforestation and additional service to visitors) and one monetary attribute (gate fee). Multinomial and random parameter logit models were used for estimation and from this the marginal willingness to pay and welfare impact of the visitors were estimated. The finding indicate that all the attributes included were significant factors in affecting the probability of choosing an alternative scenario.

The results of this study indicates that even the conservative estimate of the economic value of recreation benefit from the site is very big and it also indicates that the domestic recreation demand to the site is high. Therefore, it can be suggested that alleviating the major problems that reduce the quality of the site and supporting improvement and expansion projects by extracting revenue out of the excess benefit are essential.

Key words: Travel cost method, Choice experiment method, Economic Value, Marginal willingness to pay, Environmental valuation, Awash National Park, Ethiopia.

CHAPTER ONE

INTRODUCTION

This chapter begins by presenting the brief background of the study which is followed by the statement of the problem. Under the statement of the problem, the paper states the reasons to carry out this study. Following the statement of the problem, the general and specific objectives of the study are presented. After that, the next section presents the significance of the study and scope and limitation of the study, respectively. Finally, the organization of the paper is presented.

1.1 Background of the study

Even if recreational resources have been thought of bringing positive utility to humans, there is a limited trial to compute their true value for scarce natural resources for its provision. These resources include land, water, beaches, buildings, parks, forests, personnel, and other natural, human and financial resources. Stemming from increasing population, income, and mobility, the demand for recreational areas has been increasing in many developing Countries. Many people equate national park as recreational services with fun. They do not consider it as a subject for serious study. That is why research in recreational areas in many countries has been very limited (Clawson 1959).

Accordingly, there is a need to place a value on outdoor recreation activities and incorporate its true social costs and benefits using convincing techniques. 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. If the environment is inappropriately estimated, 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.

Clawson (1959) 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.

Given the country's high tourism resources, Ethiopia is still benefited the least out of the sector and in terms of attracting domestic and international tourists and getting foreign earning (Yabibal 2010).

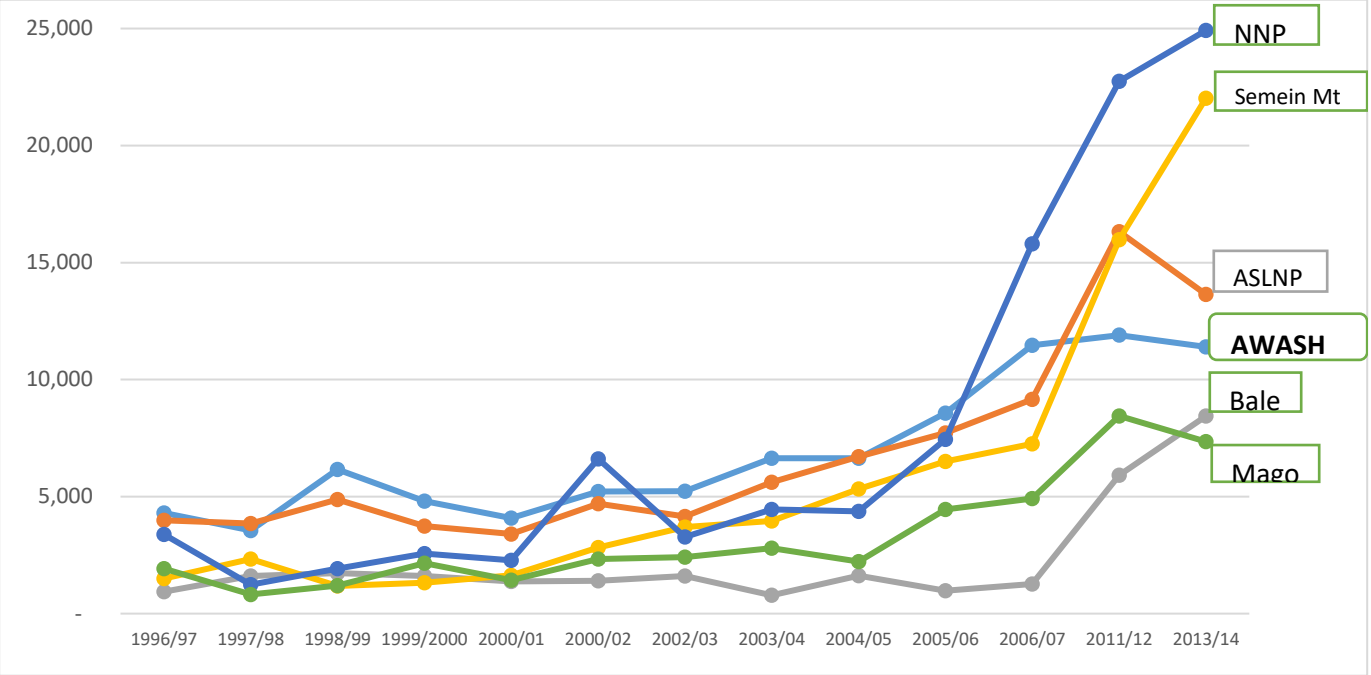
According to the World Economic Forum report 2015, in its 'The Travel & Tourism Competitiveness Index 2015 Ranking' Ethiopia's all over performance in Travel and tourism was 118th in rank from 141 world countries. When compared with neighboring and nearby countries with fewer tourism resources, Ethiopia's tourism performance is very low. In this case, while having less diversified tourism resource when compared with Ethiopia, such countries like Egypt, Kenya, and even Rwanda, which respectively stood at 83th, 78th, and 98th in their rank, were and still are in a better position than Ethiopia.

By establishing more than 55 protected areas, out of which 21 are parks, Ethiopia is making a good effort to protect and conserve its natural ecosystems and wildlife heritage. However, the country is not effectively using its rich and endemic wildlife species for ecotourism. Nature-based sustainable ecotourism is confined only in few natural parks (Alemneh 2015). The direct contribution of Travel & Tourism to GDP in 2013 was only 2.2% of GDP. The contribution of Ethiopian wildlife tourism as a source of foreign earnings and employment is also insignificant (WTTC 2013).

This is a good indicator that parks of the country have not been adequately protected, developed and used as a tourist attraction. There is a serious shortage in number and type of tourist facilities. Moreover, the quality of service is poor and unsatisfactory to tourists. Therefore, calculating the real value of environmental goods has a positive impact on generating optimal income.

Awash National Park (ANP) is one of the popular tourist destinations in Ethiopia. It has rich tourism potential that ranges from wildlife resources to natural scenic. Contrary to this, the park has not shown much progress to attract more tourists.

Figure 1.1 Tourist flow trends for selected national parks of Ethiopia



Source: EWCA, Addis Ababa

As indicated in chart-1 above, however, when compared with other parks located in Rift Valley and nearby areas of Ethiopia, ANP has been in a good position as a tourist destination. In the year 2013/14, Awash, Nechisar and Mago National Parks respectively attracted 11399, 24917, and 7356 foreign visitors. Awash National Park was relatively among the most visited tourist park in the rift valley region of Ethiopia (World Bank 2006). In 2012/13 from the 13 national parks, under the administration of the federal government of Ethiopia, ANP is the third after Simien Mountains National Park and Nechsar National Park when we compare revenue collection from tourism (Ayinalem 2014).

1.2 Statement of the problem

The Awash National Park (ANP) represents one of the most outstanding nature. Because of its rich biodiversity, its high number of endemic species and its paramount biophysical features the ANP is being a recreational resource for everyone who visits this park. It has economic impacts on society around the area of the park and it used as ecotourism site which can enhance national income and international significance.

Despite its ecological, social and economic importance, the Park is not under proper management. Besides, the precious wild mammal species diversity of the park is declining at an alarming rate. Continued land use/land cover changes coupled with increasing demand for resources have heavily affected the fauna and flora of the park. This change cannot be ignored altogether because it has unquestionable negative consequences on both the livelihood of communities surrounding the park and on the ecotourism benefit of the country. Despite its tremendous economic significance, the site has been unable to improve the qualities of ecotourism experience and expand the types and variety of its recreational services for a long time. Instead, the center is deteriorating mainly because of widespread deforestation resulting from road construction, residents of people, grass burning, agriculture, hunting, firewood collecting and domestic livestock grazing (Belay 2015).

The number of tourists that visited the park in the year 1984 and 1985 (when the country was at civil war and harsh famine) was almost the same as that of 1995 and 1996 (when the country was stable). These indicate that the park's resources are not properly managed and utilized for tourism (Daniel 2011).

Furthermore, according to the finding of Habtamu (2014), population growth, free grazing, charcoal production and new development projects were the major drivers of deforestation and forest degradation in the park. He also added that with the current rate of deforestation it will take only 71.5 years for the remaining woodland to be completely lost.

Thus, visitors might be forced to spend their recreation time on other substitute sites and the site be used for some other alternative activities, which in turn may result in irreversible damage to the different environmental resources of the site. This is due to the fact that, the current price

for different services are assigned arbitrary rather than through valuation techniques which result in the park authority to be constrained by lack of money.

To this effect, measures should be done in leadership commitment to understanding the current economic value of the park. This is because estimating the actual economic value of the Park will enable to preserve the site and generate maximum possible income from the site.

A number of studies have been conducted to estimate the benefit of recreational areas and national parks in Ethiopia. For instance, Fisseha (2014) estimate recreational visit demand of the Abijata Shalla Lakes National Park using individual travel cost method and Adugna (2016) estimates the economic value of Nechisar National Park Ecosystem using Choice Experiment Approach. However, with the best knowledge of the researcher, except Mesfin (2010) who has done on wetland ecosystem on Wondo Genet and Ali (2011) who has done on the semen mountain national park, no one tried to determine the value of national parks for recreational purpose by combining travel cost and choice experiment methods.

Even if such related studies have been conducted, with the best knowledge of the researcher, no one tried to determine the Economic value of ANP. The park has its unique features of accommodating various natural and cultural assets, like the volcanic fissures at Mt. Fentale, Awash River falls (the second biggest falls in Ethiopia, next to the Blue Nile), the natural hot springs with doum palm forest, the Fentale Hyena Community Hyena Park, its rare wildlife (Beisa Oryx), it is also the leading park in bird diversity. Therefore, because of these unique features, it's important to conduct a separate study for the park.

The question is that what is the current economic value of ANP? How can it really be measured? These questions can be answered by the application of economic valuation studies. Thus, this study was conducted to estimate the park benefits and the value that the people attach to multiple services of the park by using Travel Cost Method (TCM) and Choice Experiment Method (CEM).

1.3 Research objective

The general objective of the study is to estimate the annual economic value of ANP and to determine the visitors' preferences for different attributes using travel cost and choice experiment estimation methods.

More specifically, the study tries to;

- Identify the major attributes that are responsible for influencing the visitors' willingness to pay for the recreational services of ANP.
- Estimate the visitors' marginal willingness to pay and welfare impacts of improvements of each attribute of the park.
- Identify the significant determinants of visitations of the park

1.4 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 1966. This study can be justified for some reasons.

First, the site has great potential to generate high income and support for the tourism stakeholder if the appropriate valuation is employed. Therefore, quantitatively valuing the site will help the site authorities be aware of how much revenue they can extract out of the benefit of visitors.

Second, this study seek to contribute to a policy design for appropriately managing the site through budgetary allocations. This also assist to improve the qualities of recreation site and expand the verities of its potential services.

Finally, many protected areas are financed by government and some of them are self-financed, from the entrance fee collected from visitors. As noted by Wills (1997), many protected areas are under-funded all over the world. Therefore, another aim of this study was to find the optimum price for ANP that would make it a self-financed site. This study was also try to find ways to finance or raise funds from government, private and non-governmental organizations

in order to preserve wildlife and keep biodiversity by showing their real value using accepted valuation techniques.

1.5 Scope and limitation of the study

The study measure only the current recreational benefits of ANP which is one part of the total economic value and it is restricted to the application of travel cost and choice experiment methods to estimate the economic value and benefits of improved quality of the park as a case study. Furthermore, a sample is drawn from current visitors of the site.

The limitation of the study is that difficulties related to the practical application of the valuation techniques.

Difficulties that related with TCM are the treatment of time and treatment of overseas visitors. Treatment of the cost of time, both travel time and time spent on-site, has been problematic. In its essence, the argument for including time costs within the travel cost framework is that the opportunity cost of time must be included and hence in this survey, one-fourth of the wage rate was used for valuing travel time (Freeman 1993). The treatment of overseas visitors can vary. Clearly, the multi-destination nature of foreign tourists visit makes the single site travel cost model difficult to apply for valuation of a single recreations site by such foreign visitors in this study. One option is to take their costs of travel from their temporary residence. Prayaga *et al*. (2006) did this, treating all overseas visitors (to the Gemfest event in central Queensland) as coming from the local region.

The application of CEM is also more complex than other stated preference techniques such as CVM. The complexity extends from the questionnaire design phase right through to the data analysis stage. The added complexity, at least during the time when the technique is being established will add to the costs of the application. However, as the technique's application is refined and problems resolved, these cost disadvantages will be diminished.

1.6 Organization of the study

The thesis compose the following chapters in respective order. Following the introduction section, Chapter two presents theoretical background of environmental valuation and the literature on various methods of valuation techniques followed by a review of previous studies particularly empirical literature related to the methods of travel cost and choice experiment. The methodological framework of both valuation techniques, data collection, recreation demand variables and their expected signs, estimation techniques and survey design issues was described in detail in chapter three. Chapter four provide presentation and analysis of samples descriptive and the results of travel. Finally, chapter five summarized the main findings of the study and the chapter was also discussed some important policy implications.

CHAPTER TWO

LITERATURE REVIEW

In this chapter, both theoretical and empirical literature with particular emphasis on valuation and estimation technique for nature-based recreation site are discussed. On theoretical literature, the theoretical framework of estimation of environmental resources particularly the TCM and CEM valuation methods are given emphasis. In addition to this, in the empirical literature section, recent empirical studies in this area are reviewed.

1.7 Theoretical literature

1.7.1 Economic Valuation of Natural Resources

Environmental valuation is the process of putting monetary values on environmental goods which have no easily observed market prices. These environmental goods and services may include forests, ecosystem conservations, and parks … etc (Sitotaw 2003). The value of environmental resources should be taken into account in economic decision-making processes as well as to achieve sustainable development. But for a long time due to the difficulties of assigning the value of environmental goods and services, they were considered as they have zero or low values (Kolstad 2000).

The method of valuation of non-marketed goods has become crucial when determining the costs and benefits of public projects. Non-market valuation exercises have been conducted in many different areas, ranging from health and environmental applications to transport and public infrastructure projects. In the case of a good that is not traded in a market, an economic value of that good obviously cannot be directly obtained from the market. Markets fail to exist for some goods either because these goods simply do not exist yet, or because they are public goods for which exclusion is not possible. Nevertheless, if one wants to compare different programs by using cost-benefit analysis, the change in the quality or quantity of the non-market goods should be expressed in monetary terms. Another crucial application of valuation techniques is the determination of damages associated with a certain event. Under the Comprehensive

Environmental Response, Compensation and Liability Act of 1980 in the US, and after the events that followed the Exxon Valdez oil spill in 1989, the methods of valuation have become a central part of litigation for environmental and health-related damages in the United States and in several other countries (Alpizar *et al.* 2001).

NOAA (2006) noted that environmental valuation is largely based on the assumption that individuals are willing to pay for environmental gains and, conversely, are willing to accept compensation for some environmental losses. The individual demonstrates preferences, which in turn, places values on environmental resources. That society values environmental resources is certain; monetizing the value placed on changes in environmental assets such as coastal areas and water quality is far more complex. Environmental economists have developed a number of market and non-market-based techniques to value the environment.

1.7.2 Environmental valuation approaches

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. 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 (Hanley *et al.* 1997). The following rough presentations of environmental valuation techniques are according to Hanley *et al.* (1997).

1.7.2.1 Direct Valuation Methods (stated reference approaches)

The two well-known stated reference approaches are the contingent valuation and the choice experiment methods. Below a brief explanation of the two methods is presented.

I. Contingent Valuation Method (CVM)

It is called ‘contingent valuation’ because the valuation is contingent on the hypothetical scenario put to respondents. Its main use is to provide inputs to analyses of changes in the level of provision of public goods/bads, and especially of environmental ‘commodities’ which have

the characteristics of non-excludability and non-divisibility. 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 upon 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. The 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.

II. Choice Experiment Method (CEM)

The basic idea of this method is individual consumers derive utility/satisfaction from goods through the attributes the goods provide. The CEM is based on the idea that any environmental good can be described in terms of its attributes and the levels it takes. Respondents are presented with various alternative descriptions of a good, differentiated by their attributes and levels and are asked to rank the various alternatives to choose their most preferred attribute. There will be more discussion about CEM under 2.1.3 sub-section.

1.7.2.2 Indirect Valuation Methods (Revealed Preference Method)

The hedonic pricing and the travel cost methods are the well-known methods of environmental valuation among the indirect valuation approaches.

I. Hedonic Pricing Method (HCM)

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.

The hedonic price approach is based on the theory that value of a commodity is a bundle of valuable characteristics, one or more of which may be environmental. The basic premise of the hedonic pricing method is that the price of a marketed good is related to its characteristics, or the services it provides. "It assumes that goods and services are defined by the attributes embodied in them, and the values of these goods and services are the sum of the values of the attributes which they contain." When goods or services contain an environmental characteristic, the market value of the environmental characteristic is 'embedded' in the market price of the good or service which contains the characteristic.

II. The Travel Cost Method (TCM)

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 2.1.4 sub-section.

1.7.3 Choice experiment model

Traditional microeconomic theory constitutes the basic theoretical foundation of the choice experiment application. Hence consumers are assumed to seek to maximize utility subject to a budget constraint. Specifically, the choice experiment approach combines the characteristics theory of value (Lancaster 1966) and the random utility theory (McFadden 1974). Choice experiment applications have been commonly used in marketing, psychology, and transport research and have recently become increasingly popular in environmental valuation applications (see, for instance, Boxall *et al*. 1996; Hanley *et al*. 1997).

Problems associated with the contingent valuation technique have made elicitation formats that ask respondents to choose between discrete alternatives rather than to state their maximum willingness to pay for a particular environmental good increasingly popular. Discrete Choice CVM were the first to be applied in environmental economics context, but other stated preference techniques, such as choice experiments (CEM) have also become increasingly common. Hence, there exist several different discrete choice methods, of which the choice experiment method is one (Hanley *et al*. 1997).

The choice experiment is a stated preference valuation technique, which is capable of measuring the economic benefits associated with the attributes of an environmental policy. The basic idea behind any stated preference technique for estimating non-market environmental values is to quantify a person's willingness to bear a financial impost in order to achieve some potential (nonfinancial) environmental improvement or to avoid some potential environmental harm. Different stated preference techniques approach this task in different ways. In order to elicit passive use values, or values not associated with behavior or participation in an activity related to the environmental good, CEM and CVM techniques would ask respondents about their choices of environmental quality settings (with and without an environmental improvement for example) along with a value or cost to their household of the options. For cases of use values-values for changes in environmental quality that can be inferred through examination of behavior-CE can be used to expand the range of existing environmental quality levels, and to reduce confounding of the environmental effects and other effects so as to isolate the value of the specific change (Bennett and Blamey 2001).

The choice experiment method belongs to a family of Attribute-Based Methods (ABMs). These are a special case of Conjoint Analysis (CA). By incorporating price as an attribute, ABMs can be used for the purpose of applied welfare analysis of changes and willingness to pay (WTP) (Louviere *et al*. 2000; Adamowicz and Boxall 2001). ABMs assume that a respondent's WTP consistently relates to his or her underlying preferences. The choice experiment method was originally developed by Louviere and Hensher (1982) and Louviere and Woodworth (1983).

Applications of ABMs generally follow the seven steps outlined below (see Adamowicz and Boxall 2001).

1. *Characterization of the decision problem:* This involves the identification of the problem at hand (change in environmental quality affecting recreation behavior, change in the provision of public goods that requires a social choice mechanism to be specified for this issue, etc).
2. *Attribute level selection*: The number of attributes and value of the levels for each attribute is defined at this stage, as appropriate for the decision problem at hand.
3. *Experimental design development*: Once attributes and levels have been determined, experimental design procedures are used to construct the choice tasks, alternatives or profiles that will be presented to the respondents.
4. *Questionnaire development*: The questionnaire can vary from paper and pencil tasks to computer-aided surveys. As in any survey-based research, pre-testing of the questionnaire is a necessary component of the research program.
5. *Sample sizing and data collection*: The usual considerations of desired accuracy levels versus data collection costs must guide the definition of sample sizes.
6. *Model estimation*: The most common approach has been the use of Multinomial Logit (MNL), and the most common estimation method has been a maximum likelihood, although the most appropriate method will depend on the issues being examined.
7. *Policy Analysis and Decision Support System (DSS) development*: Most ABM applications are targeted to generating welfare measures or predictions of behavior, or both. Thus, the models are used to simulate outcomes that can be used in policy analysis or as components of decision support tools.

In CEM questionnaires, respondents are asked a series of questions in which 'choice sets' are presented. Each choice set usually contains three or more resource use options. Respondents are asked to choose their preferred option from each choice set. The options in each choice set are described using common attributes, which take on various levels. The combinations of attribute levels for each option in each choice set are established using experimental design techniques.

Similar to a contingent valuation (CV) study, before the choice sets are presented to respondents, there is a description of the study site, the research issues, the proposed policy changes, and the implication for the environmental attributes that are being modeled. Choice experiment sometimes called choice modeling has evolved from a conjoint analysis in the marketing and

transport literature. Recently, it has been developed and applied in environmental economics context by (Adamowicz *et al*. 1998) and others.

The theoretical basis of CEM is based on the fundamental building blocks: Lancaster's characteristics theory of value, and random utility theory.

1.7.3.1 The Characteristics Theory of Value

The basic assumption in choice experiment application is that consumers derive utility from the different characteristics that a good possesses, rather than from the good per se. The characteristics associated with the commodities are thus assumed to provide services to the individual (Lancaster 1966).

According to the characteristics theory of value, the probability of choosing a specific alternative (i.e. a good) is a function of the utility linked to that same alternative. Moreover, the utility derived from each alternative is assumed to be determined by the preferences over the levels of the characteristics (or services) provided by that alternatives. In the original model presented by Lancaster (1966), the goods consumed are transformed into objective characteristics, through the utility function, which is assumed to be objective and equal among all consumers. Hence, according to the characteristics theory of value, the utility is a function of the services provided by the commodities. The assumption that individuals derive utility from the characteristics of a good rather than from the good itself, implies that a change in one of the characteristics (such as the price) may result in a discrete switch from one good to another will, however, affect the probability of choosing that specific commodity on the margin.

Hanemann (1984) states that many of the choices made by individuals can be divided into two parts: (i) which good to choose; and (ii) how much to consume of the chosen good. The first part of the choice process represents the discrete aspect while the second part represents the continuous aspect of consumer choice. When choice experiments are applied in the valuation of non-market goods, the design of the experiment is in general carried out such that the discrete dimension of the choice situation is isolated.

1.7.3.2 Random Utility Theory

Random utility theory (RUT) is the second building block. In the choice experiment, where the respondent is asked to choose the most preferred among a set of alternatives, random utility theory can be used to model the choices as a function of attributes and attribute levels. According to the random utility theory, the individual is assumed to make choices based on the attributes of the alternatives with some degree of randomness. RUT says that utility derived by individuals from their choice is not directly observable, but an indirect determination of preferences is possible. The random utility theory thus provides a link between the deterministic model and a statistical model (McFadden 1974).

1.7.3.3 Strengths and Weaknesses of Choice Experiment method

The applications of choice experiment provide policy-relevant information on the values people hold for non-marketed environmental and social impacts. This information is important for a number of reasons. First, with a complete information regarding the values of all the impacts, policymakers are better equipped to make decisions that are in the best interests of the whole community. Second, with improved information that is widely accessible to the public, the prospects of vested interest groups being able to "capture" the decision-making process to their own advantage-and potentially to the disadvantage of the community as a whole-are diminished.

There are other reasons why CEM can be regarded as superior to other techniques that have been designed and used to perform the same role (Bennett and Blamey 2001). An application of the CEM technique can produce estimates of value for many alternative policy outcomes. In addition, the composition of those value estimates can be examined through the analysis of the "part-wroth" of the component attributes. This is in contrast to the most commonly used alternative non-market valuation technique, the Contingent Valuation Method (CVM). Because CVM is based on a sample of affected people's responses to questions regarding their preferences for one alternative, it is capable of providing estimates of the value of that one alternative. That value estimate is therefore specific to a particular set of circumstances and cannot be "disaggregated" into the contributions made by the individual attributes that combine

to constitute the alternative. The ability of CEM to provide estimates of multiple scenarios makes it a more versatile and cost-effective technique.

An advantage of the "disaggregation" capability inherent to CEM is that estimates of value derived from an application of CEM at one site are more likely to be valid when "transferred" to another related site. This is because the different circumstances at the transfer site can be taken into account by adjusting the levels of the attributes accordingly. Again, because CVM results are circumstance specific, they do not offer this flexibility.

There are also reasons why CEM yields results that are less susceptible to "strategic behavior" on the part of respondents. A continuing concern with regard to the use of stated preference techniques is that respondents deliberately misrepresent their preferences in order to bias the study's results in their favor. Specifically, if asked in a CVM application for the amount they are willing to pay to see an environmental good enhanced, a respondent who enjoys the environmental good may overstate their true willingness to pay in order to increase the chance of the good being provided. An advantage of CE in this respect is that it is much more difficult for respondents to identify a choice strategy that will influence the results in their favor. In the face of such uncertainty, it has been shown by Bohm (1972) that respondents are more likely, to tell the truth.

Whilst CEM demonstrates certain advantages, it is not without challenges. Foremost of these is the problem of respondent cognition. The choice sets that form the core of CEM require respondents to select their most preferred option from an array of alternatives. Each alternative is described using a number of attributes. The amount of information a respondent must assimilate and act upon is significant and in environmental CEM, the situation faced by respondents is unfamiliar.

This places a significant cognitive burden on the respondents. If this is not carefully managed through questionnaire design and presentation the outcome can be biased sampling or results that are driven not be careful consideration of the choice but by decision heuristics. The application of CEM is also more complex than other stated preference techniques such as CVM. The complexity extends from the questionnaire design phase right through to the data analysis

stage. The added complexity, at least during the time when the technique is being established will add to the costs of the application. However, as the technique's application is refined and problems resolved, these cost disadvantages will be diminished.

What this somewhat brief treatment of the strengths and weaknesses of the CE technique demonstrate is that it affords substantial promise as a means of generating policy-relevant information for decision-makers dealing with issues involving environmental impacts.

1.7.4 Travel cost method

It is difficult to identify the price and value of a commodity and service when there is not any barging in the real market. TCM is one of the techniques used to estimate the value of recreational sites using consumption behavior in related markets.

TCM is amongst the oldest environmental valuation techniques. Travel cost approach was originally proposed by Harold Hotelling in 1949 in a letter to the United States of America Department of the Interior's National Park Service. It was later redefined and applied by Clawson and Knetsch in 1966. This technique has been widely used by environmental, leisure, recreation, tourism and cultural economists and researchers in the past decades to value varying recreational activities (Henly *et al.* 1997).

This method is a non-market procedure whereby a recreational site value is estimated by considering how much people spend to access the site (travel costs, entry fees, and on-site expenditures) and also it considers the willingness of visitors to pay for the recreational site. The method assumes weak complementarity between the recreational site and consumption expenditure. This implies that when consumption expenditure falls to zero, the marginal utility of visitation is also zero, or alternatively, the recreational site will be valued only if consumption expenditure is positive. The method has become widely accepted and is generally regarded as one of the success stories of non-market valuation (Smith 1988).

The way we measure the economic value of recreation sites is discussed by Freeman (1993) as the sum of the willingness to pay for the recreation services of all the users. The uncompensated, Marshallian demand function from which consumer surplus can be calculated is derived from

the use of the travel distance, expenses incurred by those consumers using the amenity in concern, along with the socio-economic characteristics such as income, education, family size, site characteristics and substitute characteristics. The quantity of the dependent variable in the estimated demand function is the number of the trips to the site or the number of days spent recreating at the site. Price is the most important independent variable since it is what consumer surplus estimated is dependent upon. Price in this demand equation represents the cost per trip to the site. Other independent variables also play a crucial role in forming the demand curve for the recreational benefits of the study site such as the income, education and the characteristics of the site.

First, it was the Zonal Travel Cost Method (ZTCM) in which visitors are grouped into different categories or zones based on certain similar characteristics such as geographical origin in which the dependent variable is participation rate from each zone. This is the oldest form of the travel cost method. It has been employed in numerous studies such as those of Clawson and Knetsch (1966), Hanley (1989), just but to mention a few.

Nawas and Brown (1973) developed a new form of TCM based on individual visitors, where the dependent variable, i.e., the quantity consumed, is the number of trips taken per period by individuals or households known as Individual Travel Cost Method (ITCM). According to Vicente and Frutos (2010), ITCM is an advantage over ZTCM in that it follows Conventional economic methods and also relies on what people actually do. Blackwell (2007), reiterates that ITCM has become more popular in the last two decades following advances in information technology and the added advantage of being able to include socioeconomic characteristics such as age, income, education and other demographic variables to help explain individual as opposed to zonal visitation. Nowadays, most valuation studies about recreational sites use this approach.

In addition, ITCM is preferred to zonal because of its statistical efficiency, theoretical consistency in modeling individual behavior, avoidance of arbitrary zone definitions and increasing heterogeneity among populations within zones. However, in comparison to ZTCM, ITCM recreational demand analysis is complex because ITCM necessitates a more labor-

intensive data collection process and it necessarily requires the collection of all data from each sample visitor (Mendes 2002). Due to these advantages, ITCM will be applied in this study.

1.7.4.1 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. This procedure can be observed from various literature. See Andualem (2011), Sitotaw (2003) and Selam (2013) for instance.

i. Description and identification of the site:

A clear description of the site to be surveyed is important both for interviewees and interviewers to know about which 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, the actual flow of tourists/ visitors of the site, plans of the site for creating regional parks, etc.

ii. 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.

iii. 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 socioeconomic features (e.g., age, education, income, number of family members, etc.) that are supposed to be important determinants of 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.

iv.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.

v.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.

vi. 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.

vii. 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 will be 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.

viii. 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).

1.7.4.2 Difficulties with the Travel Cost Method

In practical application, there are a number of difficulties with using the travel cost method. The difficulties encountered are the treatment of time and the treatment of overseas visitors. These are discussed below.

I. ***Treatment of time:*** Since the very earliest applications of the travel cost method (see, for example, Cesario 1976) the treatment of the cost of time, both travel time and time spent on-site, has been problematic. Travel time values, particularly, are difficult to analyze in that we have no definite a priori notion about whether travel time utility is positive or negative to the visitor. Visitors can be grouped either as pure visitors who are strongly site oriented (with negative travel time utility), transit visitors who make

multiple purpose trip (with undefined travel time utility), and meanderers who gain utility primarily from the journey itself and hence have incurred less opportunity cost in their travel time. The obvious problem of including travel time valuation explicitly in the benefits analysis is that like recreation consumption itself, time consumption has no market value.

In general, various sources proved that including wage to estimate travel time has improved the estimates. That is, explicitly incorporating travel time valuation in recreation benefit analysis using wage seem superior to excluding them. But rather than using the wage rate in general, Cesario (1976) has shown on the basis of evidence collected to date the value of time in respect to non-work travel is between one-fourth and one-half of the wage rate. It is, of course, necessary to point out that this is an "average" valuation that may not apply strictly to every individual since the value of time to an individual varies not only with the purpose of the trip, but it may also vary with its length, time of day, and other factors. It is clear from these findings that the use of the marginal wage rate for the value of travel time values in recreation benefit estimation is inappropriate, both from the theoretical and practical points of view. In this survey, one-fourth of the wage rate (the lower bound in the above finding) will be used for valuing travel time.

II. ***Treatment of overseas visitors:*** The treatment of overseas visitors can vary. Clearly, the multi-destination nature of foreign tourists visit, and the particular way of organizing their visit with the tour Company or agents makes the single site travel cost model difficult to apply for valuation of a single recreations site by such foreign visitors in this study. One option is to take their costs of travel from their temporary residence. Prayaga *et al*. (2006) did this, treating all overseas visitors (to the Gemfest event in central Queensland) as coming from the local region. In this study, employing this strategy would mean that overseas visitors travel costs could be determined as originating from Addis Ababa or wherever s/he temporarily settled. This would be an arbitrary assessment as international visitors would also travel to other parts of the state and country.

III. ***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 *et al.* 1983). Maximum Likelihood estimator (MLE) is then used instead of OLS. Then, we face different functional forms. 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.

1.7.4.3 Advantages of Travel Cost Method

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 is 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 (Abelson 1996).

1.8 Empirical literature

Empirical work on economic valuation using the TCM is quite vast but focused more on developed countries.

1.8.1 World's Experience in Valuing Outdoor Recreation Sites

Hanley (1989) used the TCM and the CVM to value Queen Elizabeth Park in Scotland. His results showed that WTP in TCM was less than what was obtained in the CVM. Though he could not establish which method presents the best estimates, the hypothetical situation which

presents a weakness of the CVM suggested the existence of either overestimate or underestimate of the true values.

Mladenov *et al*. (2007) conducted a study on the value of wildlife-viewing tourism as an incentive for conservation of biodiversity in the Okavango Delta in 2001 and 2002 using contingent valuation (CV) and travel cost (TC) approaches. Their result showed that the quality of wildlife viewing was significantly correlated with willingness-to-pay (WTP) for preservation and suggested that impaired biodiversity would negatively affect the value of this ecosystem. The combined CV and TC values totaled US$285 per person per annum. Extrapolated to the annual pool of visitors to the Delta in 2002, this translates to US$23 million, which is a large reservoir of funds from the tourism sector that could be used for preservation.

Rosenberger and Loomis (1999) estimated the value of ranchland to tourists visiting a resort town in the Rocky Mountains through a TCM that combines information on observed behavior data from actual trips with contingent behavior data on intended current visitation if the resource was converted to urban and resort uses. A random-effects Poisson regression model was estimated by Twerefou and Ababio (2012) using panel data. Their results indicate that twenty-five percent of the samples would reduce visitation and twenty-three percent of the sample would increase visitation if ranch open space were converted to urban and resort uses. The overall effect of converting ranch open space to a resort and urban uses is no net change in average CS per trip for summer tourists in general.

Sharawi (2000) 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 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.

Mungatana and Navrud (1994) used TCM to estimate the value of preserving the current flamingo population in Lake Nakuru National Park in Kenya, with respondents asked what percentage of their time in the Park was spent viewing and photographing flamingos. The annual recreational value of wildlife viewing in the Park was found to be USD 1.5–7.5 million, with the flamingos accounting for more than one-third of this. In 1991 Kenya Wildlife Service‘s total revenue from entrance fees, royalties from hotels and lodges and camping fees were 5–10% of the observed recreational value, *i.e*. the Park had a much larger economic potential than was actually realized. Protecting the flamingos contributes both to nature conservation and financially to the social welfare of the country. Mendes and Proenca (2005) used on-site individual observation Travel Cost Model to estimate the recreational value of Peneda-Gers Natural Park (PGNP). Count Data distributions and a version of hyperbolic discounting framework distribution were used to estimate a measure of the present recreation use of the site and the total discounted recreation value for a 50-year period. They obtained for one recreation day in the PGNP at the present moment of the questionnaire values 124 € (2005 prices) for the average representative visitor of the sample, and 593 € per each average five days length visit by considering that if the average representative visitor would keep on visiting the park for 50 more years, the total recreation value of each visit would be 3874 € and each average five days length visit would be worth 17896 €.

1.8.2 Ethiopia's Experience in Valuing Outdoor Recreation Sites

Mahamud (1998) conducted a research to attach quantitative estimates to the on-site recreational benefit of Sodere recreational area in Ethiopia and to measure welfare effects of the existing problems of the site (i.e. congestion and malaria) that were proposed to have negative impacts on the recreational qualities. In doing so, the study applied two standard procedures in environmental economics, i.e. the travel cost (TCM) and contingent valuation methods (CVM), using primary data collected from a survey of 232 visitors at Sodere recreational area. In the TCM, he found travel costs, visitor's income, mode of transport and experience on other substitute sites were major determinants of visits to the site. On the other hand, age, education, family size, marital status and ethnicity of visitor's were not significant determinants of the visits to Sodere. In the CVM also sample visitors were asked hypothetical questions designed to elicit how much money they were willing to pay in exchange for access to improved recreation qualities. His results showed that visitor's income, visitor's attitude towards the problems, and visitor's position and responsibility in the household were important determinants of the WTP responses.

Sitotaw (2003) estimated the economic benefit of outdoor recreation-site of Wabi Shebele Langano recreation-site using Individual Travel Cost Method (ITCM) to measure the recreational economic benefits from Wabi Shebele Langano recreation-site. 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 ETB 8, 685,774 (USD 1,009,974). However, the site authorities collected 20.87% of this sum, showing that the site is perhaps not used efficiently.

In his master's thesis, Melaku (2007) has applied TCM to estimate the economic value of an ecotourism area taking Bishangari Lodge as a case study using Poisson regression model. In his effort to estimate the value of recreation for this site, 173 were used as his samples that represent various segments of visitors such as stopovers, conference tourists; resident expatriates tourists and business men/women. Then, a proportional probability sampling was adapted to interview individual visitors at each segment. In the interview, socioeconomic and

attitudinal information was gathered from the respondents. The regression results showed that distance travel cost, number of days of stay at Bishangari, income, education, Waynee substitute site and group travel were important determinants of the recreation demand of the site. While the coefficient of distance travel cost presented negative and significant figure; income, group visits and a visit to Weynee lodge resulted in a significant and positive influence on the visit to Bishangari. The aggregate on-site recreational benefit per visit amounted to ETB 820. The total annual benefit of the site was estimated to be ETB 3,943,500. However, the site authorities collected only about 25% of the true recreational benefit of the site, for the survey 12 months, showing that the site is not used efficiently.

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 a residence on the basis of the distance from the site. In the interview, socio-economic demographic and attitudinal information was 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 ETB 40 and the maximum expected revenue for the site is ETB 85,812,000 (=40x21378) where 21378 is the number of total visits per year. The economic value of the park was estimated at ETB 2,181,998,095 per year based on the demand curve.

Mesfin (2010) attached quantitative estimates to the on-site recreational benefit of wondo genet recreational Site, the study applied two standard procedures in Environmental Economics, i.e. Travel Cost and Choice Experiment Methods, using primary data collected from a survey of 192 visitors at ANP site. The Travel Cost Method used the amount of money and time people spend getting to the site to derive the demand function for the site, which in turn was used to calculate recreational benefits associated with the site. Like other similar studies, travel costs, visitor's income, cost of accessing a substitute site, education and acquaintance with the site were identified as major determinants of visits to the site. Using the Maximum Likelihood

estimators of truncated models, the annual on-site recreational benefit of the site was estimated to be ETB 7,899,301 per year. On the other hand, the Choice Experiment Method was used to estimate the value of improvement of the site's quality in general in terms of the attributes selected i.e., three recreational attributes (forest, recreational quality and general service) and one monetary attribute (gate fee). Multinomial and random parameter logit models were used for estimation. All the attributes included were significant factors in affecting the probability of choosing an alternative scenario. Visitors were concerned about the recreational quality attribute. The marginal willingness to pay for the recreational quality attribute was ETB 7 per visit while for general service attribute it was ETB 2.93 per visit. Low willingness to pay is observed for improvement in the degraded plantation of the site.

The objective of Fisseha (2014), on his master thesis, was to estimate recreational visit demand of the Abijata Shalla Lakes National Park in Ethiopia and estimate visitors use value and identify recreational determinants using individual travel cost method. The data was collected from 99 visitor samples at the park using structured questionnaire and analysis was made using count data Poisson model. Based on the analysis per person on the average visit was found to be 1.79. Average visitor's consumer surplus was found to be ETB 3,107 per visit. Total annual on-site visitors recreational demand was estimated to be ETB 40.4 million during the study period. The net present non-market recreational demand of the park was ETB 0.6 billion in 20 years period. The regression analysis result showed that visitors travel cost, visitor's family size and the existence of substitute site were found to negatively while visitors' family after-tax monthly income, visiting experience and visitors' attitude toward the park was found to positively affect the recreation demand of the park positively. The identified factors affecting the Park should be considered during park recreation policy development. In addition, annual revenue collected by the park was only 3% visitors' use value. Therefore, it is possible to further increase the revenue of the park. To do that strengthen the park conservation activates are important.

Selam (2013) estimated the outdoor recreational value of Lake Hawassa. 155 on-site visitor samples were surveyed using a face to face interview. From the results age, travel cost and income were found to be significant determinants of demand for outdoor recreation while the other socioeconomic variables were insignificant. Using the Truncated Poisson Model (TPM)

of regression the individual and total annual outdoor recreational benefit of Lake Hawassa was estimated to be ETB 446.3626 and ETB 72,572,760.12 respectively; while the individual and total annual consumer surplus were estimated to be ETB 227.8583 and ETB 37,046,811.82. Based on the results it is suggested that both the city administration and potential investors should use the result of the study as a base for current and future investment decisions. In addition, as the health of the lake, the flora and fauna species are being endangered by pollution of various types, care has to be given by all and there should be the enactment and implementation of policies and rules that hinder polluting activities and encourage protection of the lake to make sure the sustainable use of the resource.

Adugna (2016) estimates the economic value of Nechisar National Park Ecosystem using Choice Experiment Approach. Primary data were collected from 210 visitors. The choice experimental model used to elicit tourists' preferences for improvements of the park's ecosystem through a willingness to pay for attributes such as afforestation, wildlife population and additional services using entrance fee as a vehicle of payment. Multinomial and Random parameter logit model was used for the estimation. The marginal WTP calculated from RPL model for each attribute were approximately 5.2, 8.79, 11.2 in ETB for domestic visitors and 7.7, 8.11, 35.87 in ETB for foreign visitors per visit per individual respectively for afforestation, wildlife population and additional services. Hence, tourists' order of preference was additional services, wildlife population and afforestation for both local and foreign tourists. In the meantime, compensating surplus for three improvement scenarios (low, medium and high) were estimated. Hence, the total economic value of the park in terms of welfare estimation from high impact scenario was summed up to be 749,107,667 ETB (US $ 35,876,804).

In his master's thesis Ali (2011) estimate the economic benefit of the semen mountain national park. The study used travel cost and choice experiment valuation methods to estimate and analyze the value visitors attach to the park. From the travel cost method, the expected aggregate annual recreational economic benefit gained by visitors of the site is estimated at ETB 48,562,086.4 (approximately US$ 2,943,156.7). While the choice experiment method (CE) was employed to measure visitor's valuation of different attributes of the site, and to examine their general perception towards the park's services and resources. Three attributes that can explain the park's quality (namely, the number of Walia ibex and Ethiopian wolf population,

afforestation and additional service to visitors) and one monetary attribute were included in the choice experiment. The results of this study indicate that the recreational economic benefits of the parks are much larger than what is currently collected by park authorities.

Generally, from these empirical works, we can deduce that the true economic values of almost all recreation sites are undervalued. Hence recreation sites must get their actual economic values so that they can get protection and adds value to the economic activity of concerned people. Therefore, this thesis will attempt to estimate the actual economic value of ANP.

In addition to this, the empirical works showed us that the existing research on the benefits associated with recreation has largely been restricted to either the estimation of a recreational benefit using the travel cost method or to the value associated with improvements to the recreational resource using the contingent valuation method or to a combination of the two or the CE methods. Existing research in developing countries in general and in Ethiopia in particular, however, with the best knowledge of the researcher, failed to combine travel cost and multi-attribute based valuation (choice experiment) methods to value national parks. Thus, this research is expected to address this knowledge gap by using the two methods and by estimating the annual economic benefit of one trip on the recreational area that has not received much attention in the literature in general and in Ethiopia in particular.

CHAPTER THREE

RESEARCH METHODOLOGY

Introduction

Getting the research methodology right is the first step towards organized research, which is more likely to be good research. The research methodology provides the structure of the research and links all of the elements of the research together. It provides the researcher the opportunity to carefully consider the research and to plan the way in which they will approach the research.

In this chapter, the researcher concentrates on the methods that were adopted throughout the study to accomplish the research objectives. It includes the research design that was adopted to examine the determinants, the type of data that was used and the sampling design that was employed to collect the data, the methods that was employed to analyze the data and the model specifications.

1.9 Research approach and design

To achieve the objective of the study, the researcher used quantitative research approach because quantitative research is the systematic and scientific investigation of quantitative properties and phenomena and their relationships. Quantitative research is concerned with testing hypotheses derived from theory and/or being able to estimate the size of a phenomenon of interest. The researcher collect data on participant and situational characteristics in order to statistically control for their influence on the dependent, or outcome, variable. As the intent is to generalize from the research participants to a larger population, the researcher employed probability sampling to select participants. Therefore, the data was collected from primary sources.

As this study is to identify the determinants of visitations of the recreation Area, Causal research, also known as explanatory research, was employed in order to identify the extent and nature of cause-and-effect relationships. The causal design was selected because it focuses on an analysis of a situation or a specific problem to explain the patterns of relationships between variables.

According to Zikmund *et al*. (2012), Advantages of Causal Research (Explanatory Research) includes:

i. Causal studies may play an instrumental role in terms of identifying reasons behind a wide range of processes, as well as, assessing the impacts of changes in existing norms, processes etc.
ii. Causal studies usually offer the advantages of replication if the necessity arises
iii. This type of studies are associated with greater levels of internal validity due to systematic selection of subjects

1.10 Sampling procedure and Sample size

In this thesis work, stratified sampling technique was applied to conduct this survey on the site because it is crucial to first split the population into groups. In this case, there are two group's i.e, foreigners and local/domestic visitors. In this sampling technique, the interviewer randomly chose and picked respondents from each group. It is Much less complicated and less costly both in time and financially to collect data.

The size of a sample is an important element in determining the statistical precision with which population values can be estimated. In general, increased sample size is associated with decreased sampling error. The larger the sample, the more likely the results are to represent the population. However, the relationship between sampling error and the sample size is not simple proportional. Generally, determination of sample size depends upon a number of factors, namely size and variability of the target population, resource constraints, the allowable margin of error between the samples mean, and the populations mean, and the level of confidence required (Martin 2004).

The level of precision, also known as the significance level, is the range (in percentage points) in which the actual population mean is to be estimated. In most cases, a 90 percent confidence level is used if the study is intended to identify marginal relationships, while the 99 percent confidence level is used where decisions from the study of interest are critical (Mendenhall and Sincich 1996).

10% level of precision ensures representative from the selected population because the generally accepted level of precision for representative samples was 10 or less percent (Fink 2003). And formerly this level of precision was applied by Andualem G. in his master thesis to value Addis Ababa Lion Zoo Park in 2011.

According to the information obtained from the site authority, during the past six consecutive years (2011/12-2016/17) on average 3,479 local visitors and 6,524 foreign visitors visited the site per annum (see appendix 2A). Based on this annual user population, 90 percent confidence level and 10 percent desired level of precision; the sample size of the study is determined as;

For local visitors:

$$n = \frac{N}{1 + N(e^2)} = \frac{3479}{1 + (3479 * 0.1^2)} \approx 97$$

For foreign visitors:

$$n = \frac{N}{1 + N(e^2)} = \frac{6524}{1 + (6524 * 0.1^2)} \approx 98$$

Where:

n = required sample size
N = Average visitor population size per annum
e = 10% level of precision

Based on the above equation, the sample size of the study was determined to be 97 individual for local visitors and 98 individual visitors for foreigners. Thus, the minimum sample size determined to be 195 for the study sites. Hence, assuming for about 2% increase to account for incomplete or missing questionnaires 199 visitors were selected as a sample.

1.11 Data sources and data collection method

Data from EWCA shows that visitors to ANP are both local and non-local visitors. The target population of the study for estimating ITCM and CEM were defined as onsite visitors. So the ideal target population for conducting onsite field survey of the site were all those recreationists who visit this site in a given time period. Therefore, the universal population of this research was all visitor users, non-visitors were not sampled.

To estimate the economic value of ANP, primary data was collected through on-site face-to-face interviews using structured questionnaire from November 15/2017 - December 15/2017. This period was preferred by the researcher because there is a large number of visitors in this season. 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 (Sitotaw 2003).

For collecting data, highly trained and experienced enumerator was employed. Semi-structured and pre-tested questionnaire were also be used to collect information from 199 visitors. The questionnaire was composed of introduction, variables related to visiting configuration, variables related to socioeconomic characteristics and variables related to individual visitors' attitudes and perception and preferences of visitors to different attributes of the park (see Appendix 1). Before starting data collection the main purpose of the study was explained to each and every respondent. By doing so respondents were expected to ensure confidentiality which allows the researcher to get unbiased information.

1.12 Data analysis method

1.12.1 Data Analysis

1.12.1.1 Descriptive Analysis

The questionnaire was designed into five sections so as to collect data on socio-economic characteristic, travel and on-site information, choice experiment scenario, follow up questions and general perception and observation of the site for various measures affecting the recreational quality of the site.

The data was presented by using descriptive statistics. The frequency, mean and other distribution were presented or tabulated by using table and their respective distribution or percentage.

1.12.1.2 Econometric Analysis

The econometric model that was presented in this section attempted to make some analysis and make inferences based on the information obtained from the sampled respondents. These econometric methods employed to estimate the annual recreational value of the sites and the consumer surplus of the visitors. Details was presented under 1.13 and 1.14 sub-sections.

1.13 The Travel Cost Model Specification

Awash National Park recreation demand study carried out based on information obtained from actual visitors of the site during the survey period. Since potential visitors were 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 (Non-visitors were not sampled and hence excluded from the study). Therefore, the application of ordinary least squares (OLS) might give biased estimates of the parameters. Since the dependent variable (number of visits) is truncated at a certain point, maximum likelihood estimation (MLE) was taken as an appropriate technique in selecting recreation demand model (Greene 2000).

But the type of data will affect the selection of the type of regression model and the functional relationship between the dependent and independent variables. Since all observed visitors have taken at least the current trip, non-visitors were not observed, so the sample is also truncated at zero. Because of this, truncated data model was used to estimate the demand curve for trips using data from an on-site survey of visitors to ANP.

The truncated model is adopted from the general presentation on Greene (2008), with some modification to recreation sites. The density function, the conditional mean, and variance of the truncated variable are presented as follows. Consider the trip generating function of an individual travel cost method as

$$V_{ij} = \beta' X + \varepsilon_i \text{ ---------- (1)}$$

And assume that $\frac{V_{ij}}{X_t} \approx N(\mu, \sigma^2);\ \mu = \beta' X_t$

Where V_{ij} is individual i's visit to site j, X_t is vector of explanatory variables, β is a parameter vector to be estimated, and ε_i is an error term.

With truncated sampling, we observe V_{ij} only if $V_{ij} \geq 1$. This implies that $\beta' X_t + \varepsilon_i \geq 1\ or\ \varepsilon_i \geq 1 - \beta' X_t$. Clearly, $E(\varepsilon_i/(\varepsilon_i \geq 1) - \beta' X_t$ is not equal to zero. In fact, it will be a function of X_i. Thus the residual is correlated with the explanatory variable X_i, and we get inconsistent estimates of the parameters, β, if we use OLS Method.

Given that V_{ij} is truncated from below at $V_{ij} \geq 1$, the density function of the truncated variable (V_{ij}) with probability function of $f(V_{ij})$, and mean $\mu = \beta' X_t$, and standard deviation σ is given by,

$$f\left(\frac{V_{ij}}{V_{ij} \geq 1}\right) = f(V_{ij})/(prob(V_{ij}) \geq 1)$$

$$= \frac{\frac{1}{\sigma}\emptyset\left((V_{ij} - \beta' X_i)/\sigma\right)}{(1 - \Phi(\alpha_i)} \text{ ---------- (2)}$$

Where $\Phi(.)$= standard normal cdf

$\emptyset(.)$ = standard normal pdf

$$\alpha_i = \frac{1-\beta' X_i}{\sigma}$$

This follows that

$$E\left(V_{ij}/(V_{ij} \geq 1\right) = \beta' X\, \sigma \frac{\left((1-\beta' X_t)/\sigma\right)}{1-\Phi((1-\beta' X_t)\sigma)} \text{ ---------- (3)}$$

And

$$var(V_{ij}/\, V_{ij} \geq 1) = \sigma^2(1 - \delta(\alpha_i) \text{ ---------- (4)}$$

The conditional mean is therefore non-linear function of *X* and β, and so is the variance. Therefore, ML estimation is preferred to OLS for this type of data set. In ML estimation technique, we find the estimator β that maximizes the log-likelihood function which is simply the sum of logs of the density function in equation (2). But note that in a truncated model, the marginal effect which is the partial derivative of equation (3) is not equal to β, rather it is equal to $\beta\,(1-\delta(\alpha_i))$. It is this value that will be of great importance in the calculation of recreation benefit.

1.13.1 Functional Forms

In empirical estimation of recreation demand models, several functional forms have been used. The most popular functional forms are linear, quadratic, semi-log and log-log. Theoretically, no one of these functional forms are better than others as argued by Kealy and Bishop (1986). However, empirical studies have shown that the log-log form is preferred. In an admittedly restrictive test, Mahmmud (1998) compared linear, quadratic and semi-log forms for sodere recreation site and concluded that the log-log form was preferred. In this study, therefore, the log-log form was used.

1.13.2 Variable specification

In order to estimate economic recreation demand, appropriate variables must be specified. Variable specification should be based on economic theory and the previous literature related to recreation trips using similar modeling techniques. Chapter 2 shows that ITCM allows for

the estimation of an ordinary demand curve where trips demanded are a function of individual travel costs, substitute prices, income and other socioeconomic characteristics. Following the theory of welfare economics, if an ordinary demand curve can be estimated, then the value of the site in question can be measured, due to the weak complementarity relationship between travel cost and site access. This implies travel consumer surplus and resource consumer surplus are equivalent, thus allowing for the measurement of individual consumer surplus for a trip to the recreation site. This individual consumer surplus can be aggregated across users to determine the net economic value of the site (Fisseha 2014).

1.13.3 Specific Equation

In this method, a demand function was estimated using the number of visits to a site as the dependent variable and the travel cost associated with the trip and household socioeconomic characteristics as independent variables. All the variables, dependent and explanatory, were constructed based on answers to the questionnaire. In this study, the specific econometric model that was used to describe the relationship between individual visits per year and the travel cost and other explanatory variables of the ITCM is given in log-log form as

$$\ln(NOV)_t = \beta_0 + \beta_1 ln(TC)_t + \beta_2 ln(STC)_t + \beta_3 ln(AGE)_t + \beta_4 ln(EDU)_t + \beta_5 ln(FSIZE)_t + \beta_6 ln(INCOM)_t + \beta_7 ln(KNOW)_t + \beta_8 (DGEN)_t + \beta_9 (DMARS)_t + \beta_{10} (DMOT)_t + \beta_{11} (DGRP)_t + \beta_{12} (DEMP)_t + \varepsilon_i \text{ ---------- (5)}$$

Where;

a. *NOV*: represents the total number of visits individual *i* takes to ANP during the past one year.
b. *TC*: This variable represents the total travel cost associated with a round trip to and from ANP. This include fuel cost or transport cost, and travel and on-site time costs. It was valued in Ethiopian Birr (ETB).
c. *STC*: This variable represents the respondent's cost of accessing the substitute recreation site.
d. *AGE*: This represents the age in years.
e. *EDU*: This represents visitor's formal educational level in years of education.

f. *FSIZE*: This is family size that was measured as the total number of people in the visitor's household.
g. *INCOM*: This variable represents the disposable monthly income of visitor *i*.
h. *KNOW*: This represents the number of years that visitors have known the site. It reflects the accumulated knowledge of visitor *i* about the site.
i. *DGEN*: This is the sex of visitor *i*. It was included in the study as a dummy variable, where 1 for male and 0 for female, to scrutinize whether gender of visitors is an important determinant of number of visits to the site.
j. *DMARS*: This variable represents the marital status of the visitor. It was included in the study as a dummy variable, where 1 for married and 0 for otherwise, to test whether marital status is important determinant of the number of visit to the site.
k. *DGRP*: This represents whether recreational trips are made in groups or alone. It was included as a dummy variable, where 1 for group trips and 0 otherwise, to test the hypothesis that group trips are important determinant of number of visits to the site.
l. *DMOT*: This variable represents the mode of transport that is used during trip to ANP. It was included as dummy, where 1 for own car and 0 otherwise, to test the hypothesis that using own car is important determinant of visits to the site.
m. *DEMP*: This variable represents whether the visitor is a full-time employee or not. It was included as a dummy variable, where 1 for a full-time employee and 0 for otherwise, to test whether it is an important determinant of the number of visits to the site

$\boldsymbol{\beta_1}. \ . \ . \boldsymbol{\beta_{12}}$ are regression coefficients which measure the changes in the number of visits as a result of a unit change in the explanatory variable, other things remaining constant.

1.13.4 Expected signs and background of variables

Dependent Variable

Number of visit (NOV): The dependent variable in estimating annual economic value of ANP is the number of visit for last 12 months with the current recreational quality status of the site. In single-site ANP framework visitors are assumed to choose the optimal number of trips in the context of a utility maximization problem subject to budget and time constraints. The optimal

number of trips is the quantity demanded which, in accordance with economic theory, is explained mainly by the price of the good, consumer income, substitutes' price consumer preferences and other recreation demand explanatory variables. These preferences are a function of individual characteristics and are expressed through choices (Freeman 1993).

Independent Variable

a) **Total Travel Cost (TC):** Due to non-rival and/or non-exclusive characteristics outdoor recreation on public land is not traded in the market place. There is no traditional market for outdoor recreation and the user fees for many recreation resources are nominal or zero. Therefore, to estimate an ordinary demand curve a proxy for price must be developed. The price variable consists of the full price of a recreation trip made up of the admission fee, the out of pocket cost of travel to the site, the time costs of travel to the site and the cost of onsite time (Freeman 1993). The literature varies on methods for calculating out of pocket travel costs. Bowker *et al*. (1996) used household expenditures divided by group size plus the costs of travel, valued at $.092/km, in their study of guided white water rafting trips. In Zawacki *et al.* (2000) two different out of pocket calculation models were made in estimating demand for non-consumptive wildlife recreation in the U.S. The first model used all out of pocket expenditures including food, lodging, transportation costs, and fees. The second model incorporated only out of pocket expenditures for transportation and fees. Fix and Loomis (1998) chose to only include variable travel and onsite costs in their study of economic benefits of mountain biking at Moab. Variable travel costs included fuel, lodging, airfare, car rental, and miscellaneous expenses. Onsite costs consisted of lodging, fees, and miscellaneous expenditures. Fix and Loomis (1998) felt that food was not a variable expense and as such was not reported, nor were durable goods expenditures. A similar approach was used in Fix and Loomis (1998) to compare WTP from revealed and stated preference models for mountain biking at Moab.

Since time costs need to be measured in a manner consistent with out of pocket costs and access fees, a defensible shadow price of time must be used to convert time to a monetary value (Freeman 1993). Cesario (1976) valued individual time at one-third the wage rate in his article estimating benefits of recreation at parks in the Northeast. Ward and Beal (2000) suggest zero percent as appropriate, since individuals travel for leisure and recreation mostly during holidays

when they face no loss of income. Parsons *et al*. (2003) observe that the recreation demand literature has more or less accepted 25% as the lower bound and the full wage as the upper bound.

Calculating the right cost is the basic work in TCM valuation. Failure to do so will further over or underestimate visitor's consumer surplus. In this study, the cost components include transportation cost and time cost. However, on-site pocket moneyed cost was omitted because there were great differences. Some were used camp site on the site with minimum cost while the others were used highly expensive ecologies. Food cost is also excluded. There are two reasons for the omission. In the first place, food cost is not directly related to visiting. In the second place, there were highly different on the on onsite expense for food and drink.

- **Transportation cost:** Transportation cost consists of the cost, bus or airplane tickets, or the cost of gasoline and vehicle maintenance. Therefore, the transportation cost of visitors depends on means of transportation. The cost incurred by a visitor from his resident home multiplied by two to make it round trip transportation cost.
- **Time cost:** Bergstrom *et al*. (2004*)* suggested that the shadow price of time may lie somewhere between one-fourth and one-half of the wage rate and that the value of one-fourth of the wage rate may be appropriate. In this study, one-fourth of individual wage rate was used as an opportunity cost of trip and on-site time cost.

The incurred travel costs will be based on visitor self-reported one-way travel costs, travel time and entrance fees. Transportation and opportunity costs of time for traveling were multiplied by 2 to get the total round-trip costs (e.g. Fix and Loomis 1998). An important issue in this study was that many visitors traveled in groups. This includes both families and individuals traveling in groups. If visitors were traveling in a group, the reported total transportation costs were divided by the number of persons in the group in order to calculate the round-trip travel costs per person per family. If the respondent was visiting the site with family, a randomly selected family member was selected. Time costs was calculated at one-fourth of wage rates. *For TC is considered as a proxy for a price in recreation demand analysis, the relationship between **TC** and number of **VISITS** was expected to be negative.*

b) **Substitute Sites travel cost (STC):** The substitute site was defined as the place that has characteristics similar to Awash National Park. Theory suggests that inclusion of a substitute variable is important in correctly estimating the benefits of recreation trips (Loomis and Walsh 1997). The names of these substitute locations was not given. Mesfin (2010) used a similar approach to define substitute sites in his study that estimate the value of on-site recreational benefit of wondo genet recreational Site. *The demand for the site will rise when the costs of accessing the substitute site increase. Therefore, a positive relationship was expected.*

c) **Age (AGE):** Age has been found to influence the demand for various types of recreation activities (Fix and Loomis 1998). 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 age is measured in years. *A negative sign was expected since older people are relatively less interested in traveling long distances for recreation than the younger ones.*

d) **Formal Educational Level (EDU):** Shrestha *et al*. (2002) explained that the effect of education and studies on recreation demand function is positive and meaningful. This matter is because of people`s increased knowledge by studying and knowing the importance of environmental resources. It is believed that educated people have more information on importance and use of recreation purpose than uneducated and visit recreational sites, where special activities are offered. *The sign of education level was expected to be positive.*

e) **Family Size (FSIZE):** It is the total number of people in the visitor's households. Sitotaw (2003) found that family size affected negatively in Wabi-shebale Langano recreation site demand analysis. A visitor with a large number of family size spends a relatively more proportion of its income on the consumption of composite goods than recreational activities. *Thus, a negative relationship* was *expected between FMSIZE and number of VISITS.*

f) **Income (INCOM):** In the study conducted by Fix and Loomis (1998), family disposable income was seen as a commonly investigated determinant of recreation behavior. It indicates the ability of individuals to visit wilderness areas as well as purchase the appropriate equipment. Sievanen (2005) highlighted that the education structure changes in population income levels. Also the work changes more to information based work. Differences in income levels can affect the outdoor recreation behavior. Many found it negative or non-significant (Loomis 2003). *In*

this study, income was expected to exert a positive effect on number of visits. Therefore, positive sign was expected.

g) **Acquaintance of the site (KNOW):** It measures both the quantity and quality dimensions of visits, probably suggesting that longer acquaintance with the site reflects a greater degree of preference for the area. *Therefore, a significant positive relationship between KNW and number of VISITS was expected.*

h) **Gender (DGEN):** Loomis and Walsh (1997) claim gender can be an important demand determinant. The trail literature does not provide a lot of direction in the inclusion of a gender variable. Englin and Shonkwiler (1995) included gender to estimate long-run demand for hiking. In this study, a value of 1 for male and 0 for female was assigned to scrutinize whether gender is a significant determinant of visits to ASLNP recreation site or not. *The relationship between gender and number of visits cannot be determined a priori.*

i) **Marital status (DMARS):** Loomis and Walsh (1997) argue that visitor's marital status is also expected to influence the number of visits. New marriage might increase frequency of visits to a recreation site (Shrestha *et al*. 2002). Dummy variable 1 for married and 0 otherwise was used. 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.*

j) **Trip group size (DGRP)**: Chamberlin (1974) explained that groups sharing attitudes searching for outdoor recreation has effect on the number of visits. *In this case, number of group size was used as a continuous variable and positive sign was expected.*

k) **Mode of transport (DMOT):** Mrozek and Taylor (2002) examined mode of transport used into a recreation site demand analysis. This thesis assumes that there are two types of vehicles, private vehicle including tour service and rented cars. The alternative one is public transport. The two modes of transports used to access the site. But differ in comfort, cost and time-saving. There is no economic theory and empirical. Dummy variable was used taking a value of 1 for public transport and 0 otherwise. *A positive relationship was expected, for visitors usually find own cars to be convenient for recreational trips to the site.*

l) **Full-time employee (DEMP):** This variable represents whether the visitor is a full-time employee or not. It was included as a dummy variable, where 1 for a full-time employee and 0 for otherwise, to test whether it is an important determinant of the number of visits to the site

1.14 The Choice Experiment Model Specification

In a choice experiment analysis, respondents are offered with a series of choices, which are different attributes and attributes levels, and asked to choose their best choice. A baselines or status quo is usually included in each choice set. This is because one of the choices must always be included in the respondent's currently feasible choice set to interpret the results in the standard welfare economic terms (Hanely *et al*. 2001).

The CEM technique depends on two fundamental theories: Lancaster's characteristics theory of value (Lancaster 1966) and random utility theory (Adamowicz *et al*. 1998). Lancaster's theory states that choice can be modeled as a function of characteristics, or attributes of the alternative relevant to a given choice problem. The random utility theory assumes that the alternative with the greatest total utility is selected. According to random utility theory the utility function for a representative consumer can be separated into a systematic or observable portion and a random or unobservable portion by the analysts. Hence, the random utility function takes the following form (Jainjun *et al*. 2013):

$$U_{in} = V_{in} + \varepsilon_{in} \text{ ---------- (6)}$$

where U_{in} is total utility of offering *i* for individual *n*; V_{in} is the systematic or stochastic component of utility, and ε_{in} is the random or unobservable component. As pointed out by Adamowicz *et al*. (1998), the econometric justification for this random component is that the analyst may omit variables or commit measurement errors; the consumer may be inattentive to the particular decision, etc.

This random component allows the analyst to make probabilistic statements about individual behavior. Thus, modeling the probability that an individual will choose ith offering from some set of competing offerings, say C, which can be shown as follow:

$$P(i \,/\, C) = \Pr\left[U_{in} > U_{jn}\right] = \Pr\left[(V_{in} > \varepsilon_{in}) > \left(V_{jn} > \varepsilon_{jn}\right)\right], \forall_j \epsilon \, \mathrm{C} \text{ ---------- (7)}$$

Where *C* is the complete choice set. In order to estimate Equation (7), it is important to transform it into a choice model. Thus, making certain assumptions about the joint distribution of the vector of random error term is demanded. As pointed by McFadden 1974, the random terms are assumed to follow the Gumbel (extreme type I) distribution and independently and identically distributed (IID) across alternative and observation. Following this assumption, the multinomial logit model (MNL) or conditional logit model is formulated, and hence the probability of choosing alternative *'i' (i=1, 2, 3… j*) over a set of J alternatives chosen by individual *t* is given as follow (Hanely, *et al*. 2001):

$$Prob\ (i) = \frac{\exp(\mu V_{it})}{\Sigma \exp(\mu V_{jt})}, V_{it} \neq V_{jt}\ ; j \in C \text{---------- (8)}$$

Where V_{it} and V_{jt} are indirect utility functions assumed to be linear in parameters and, μ is scale parameter inversely related to the standard deviation of the error term and is not separately identified in a single data set, this implies that the estimated β's cannot be interpreted as their contribution to utility since they are confounded with the scale parameter. When using the MNL model the other assumption that must be satisfied is the Independence of Irrelevant Alternatives (IIA) choices. This property follows from the independency of the error terms across the different options contained in the choice set. It states that the relative probabilities of two options being selected are not affected by introduction or removal of other alternatives (Hanely *et al*. 2006). Formulating MNL model along constants called Alternative Specific Constants (ASCs) is normal. The usual form of V_{it} is an additive form, which includes the attributes from the choice set only,

$$V_{it} = ASC_i + \Sigma \beta_{ik} X_{ik} \text{ ---------- (9)}$$

Where ASC_i is an alternative specific constant (ASC) for option *i;* X_{ik} is the k attribute value of alternative *i*; and β_{ik} is the coefficient associated with the *k* attribute of alternative *i*.

To introduce respondents' heterogeneity (that is, differences between the individual respondents) into the model, individual characteristics of respondents can be used as independent variables in the equations. One possibility for including socio-economic as well as attitudinal variables in the indirect utility functions is to include these variables interactively with the ASC (Jainjun *et al*. 2013)

$$V_{it} = ASC_i + \Sigma_k \beta_k X_K + \Sigma_h \gamma_{iht}(ASC_i * S_{ht})\text{----------} \quad (10)$$

Where S_{ht} represents the socioeconomic or attitudinal variables of individual *t*; and is the vector of coefficients associated with the individual socioeconomic characteristics interactively with the *ASC*.

1.14.1 Random Parameter Logit (RPL) Model

There are two major limitations of the multinomial logit model (Train 2003). First, the model does not recognize the correlation of error term across alternatives. This comes from the assumption of independency of irrelevant alternatives (IIA) which is unrealistic. IIA assumption rises as a result of independently and identically distributed (IID) assumption of random term. Second, it assumes homogeneous preferences across respondents. However, preferences are in fact heterogeneous and accounting for this heterogeneity enables estimation of unbiased estimates of individual preferences and enhances the accuracy and reliability of estimates of demand, participation, marginal and total welfare (Greene 1997). Moreover, (Adamowicz and Boxall 2001) mentioned that accounting for heterogeneity enables prescription of policies that take equity consideration into account. Thus, the random parameter logit (RPL) model (Train 2003), relaxes IIA assumption and accounts for unobserved and unconditional heterogeneity, should be used to account for preference heterogeneity in pure public goods like national parks though it is statistically complex (Birol *et al*. 2006)

The random utility functions for the random parameter logit models take the following form (Birol *et al*. 2006):

$$U_{it} = V_{it} + \varepsilon_{it} = Z_i(\beta + \eta_t) + \boldsymbol{\varepsilon_{it}}\text{----------} \quad (11)$$

Where U_{it} is the total utility for respondent *t* from choosing alternative *i* in the choice set. It is assumed that the utility function consists of both systematic components (V_{it}) and stochastic component ($\boldsymbol{\varepsilon_{it}}$). The indirect utility is assumed to be a function of the choice attributes *Z* with parameters β (and socioeconomic and environmental attitudinal variables, if included in the

model), which due to preference heterogeneity may vary across respondents by a random component η_t

The probability that an individual *t* chooses alternative *i* from each choice set is then presented as:

$$P_{it} = \frac{e^{Z_{it}(\beta+\eta_t)}}{\sum e^{Z_{jt}(\beta+\eta_t)}} \text{---------- (12)}$$

As noted by Birol *et al.* (2006), since the RPL model does not require the IIA assumption, the stochastic part of utility may be correlated among alternatives and across the sequence of choices via the common influence of η_t . Moreover, it is indicated that in terms of overall fit and welfare estimates, RPL model is superior to multinomial logit model. Another advantage of the RPL approach is that the procedure explicitly incorporates and accounts for heterogeneity in tastes.

The estimated deterministic (indirect) utility function generally will have a form of:

$$V_{ij} = ASC + \sum \beta_k Z_k + \sum \beta_m S_m \text{ ---------- (13)}$$

ASC is the alternative specific constant that captures effect of any attribute (not included in the choice specific attributes) on utility; k is the number of attributes and m is the number of socioeconomic factors. Note that socioeconomic factors are constant across choice occasions for any individual and can only enter as interaction terms with the attributes.

1.14.2 Implicit Price (Part Worth)

If one of the attributes under consideration in the study would be measured in terms of monetary value, it is possible to compute the amount that the individuals are willing to pay to enjoy more of the ecosystem attributes. This procedure is called implicit price or part worth estimation that helps to monetize other non-monetary environmental attributes in choice modeling (Bennett 1999). Given that the indirect utility function is linearly specified, the marginal value change of a single environmental attribute is calculated as a negative ratio of non-monetary attributes to monetary attributes using the following formula:

$$Implicit\ price\ (WTP) = -\left(\frac{\beta_{Park\ attribute}}{\beta_{monetary\ attribute}}\right)$$ ---------- (14)

In this case β is the coefficient of the attribute after the estimation of the model, implicit price or *WTP* formula shows the marginal rate of substitution between payment and the environmental attribute; the marginal willingness to pay for improvement in environmental attribute (Birol *et al*. 2006).

Moreover, using choice experimental modeling results, it is promising to deduce the amount individual respondents of the choice experimental questionnaire are willing to pay for the change from 'the baseline' level of environmental attributes to some improvement levels defined by some policy results interested in. This process is known as estimation of compensating surplus, measure of welfare change of the people, which is consistent with the principles of welfare economics. Thus, it is convenient to use in estimation of benefit cost analysis in alternative environmental policies (Bennett 1999).

Compensating welfare measures for different environmental scenarios associated with changes in attributes of the park's ecosystem would be computed using the following formula (Birol, *et al*. 2006):

$$Compensating\ surplus\ (CS) = -\left(\frac{V^1 - V^0}{|\beta_{monetary\ attribute}|}\right)$$ ---------- (15)

V^0 represents the initial indirect utility at a baseline level and V^1 represents indirect utility related with environmental improvement with different scenarios.

1.14.3 Specification of Equation of Choice Experiment Model

Multinomial logit model is the easiest and straight forward in estimation of choice modeling. Under this model, the probability of selecting option (alternative) is formulated as a function of attributes and socio-economic variables of the respondents (Bennet 1999). Two possible ways of estimating multinomial logistic model are available (model 1 and model 2 or extended MNL).

Model 1 is estimation of the three utility functions of three options only as a function of attributes without making interactions of socio-economic variables with the main attributes or *ASC* (alternative specific constant) whereas model 2 is estimation of the utility functions using interaction of socio-economic variables with ASCs or attributes. The three options/plans are the two improvement plans (plan 1 and 2) with changes in attributes and status quo (plan 3) level. Accordingly, three indirect utility functions will be developed from Multinomial logit model. Each of the indirect utility functions represents the utility created by the three options: option 1 and 2 (improvement options) and option 3 (status quo option). The specification of the models will be as follow (Bennet 1999).

Model 1: Basic Model

The choice experiment is designed with the assumption that observable utility function would follow a strict additive form. Accordingly, the indirect utility was specified as function of selected four attributes of ANP and ASCs as follow.

$$V_i = ASC + \beta_1 AFFOR + \beta_2 WILDLP + \beta_3 ADSERVICE + \beta_4 ENTFEE \text{ ---------- (16)}$$

Where i = 1, 2, 3, and the value of ASC is 0 for status quo (plan 3) and 1 for proposed improvements (plan 1 and plan 2). Specifically, the individual three indirect utility functions can be specified as follow:

$$V_1 = ASC + \beta_1 AFFOR + \beta_2 WILDLP + \beta_3 ADSERVICE + \beta_4 ENTFEE$$

$$V_2 = ASC + \beta_1 AFFOR + \beta_2 WILDLP + \beta_3 ADSERVICE + \beta_4 ENTFEE$$

$$V_3 = \beta_1 AFFOR + \beta_2 WILDLP + \beta_3 ADSERVICE + \beta_4 ENTFEE$$

The β values (β_1, β_2, β_3 and β_4) are the coefficients associated with each of the attributes, namely *AFFOR(Afforestation), WILDLP(Wildlife life Population), ADSERVICE(Additional Service) and* ENTFEE(Entrance fee), respectively.

Notice: The *ASCs* used for V_1 and V_2 are assumed to be the same. This shows that the model under specification is generic (unlabeled). If the choice sets used were not generic one (labeled), an

alternative specific from the model under specification would be needed. This leads to using ASC_1 and ASC_2 respectively for each improvement equations as well as differing coefficients of potential attributes (Bennet 1999).

Model 2: Extended MNL Model

In the basic model, homogeneity of preferences of individuals was assumed. However, preferences might, in fact, be heterogeneous (means, differences between individual visitors). Hence, to have unbiased estimates of individual preferences, we need to account for such heterogeneity through interacting the socio-economic variables as independent variables in each of the equations that will be estimated (Birol *et al*. 2005). The most common solution to deal with the heterogeneity problem and the possible violation of the IIA assumption that underpins the MNL model is the interaction of the socio-economic variables with either the attributes or the ASC. However, due to a possible multicollinearity problem, all possible interaction between the socioeconomic characteristics and the attributes should not be included. Moreover, it has to be recognized that they cannot be introduced separately in the model. Because respondent characteristics do not vary across alternatives, ―Hessian singularities‖ arise in the model unless the socio-economic characteristics are introduced as interactions with either the attributes or the ASCs (Bennett and Blamey 2001). Five socioeconomic variables, namely age(AGE), family size(FSIZE), average monthly income (INCOM), number of years of formal education (EDU), and sex of respondents (DGEN) are included in this extended model as interactions with the ASCs which enable to capture the influence of the variables on the probability for a visitor to choose either plan 1 or 2. The specification of this model is given as follows:

$$V_i = ASC + \beta_1 AFFOR + \beta_2 WILDLP + \beta_3 ADSERVICE + \beta_4 ENTFEE + \alpha_1 * ASC_i * AGE + \alpha_1 * ASC_i * FSIZE + \alpha_1 * ASC_i * INCOM + \alpha_1 * ASC_i * EDU + \alpha_1 * ASC_i * DGEN \quad (17)$$

1.14.4 Definition of Variables and Hypothesis in CE

ASC: This represents Alternative Specific Constant and takes values 1 for the attributes with changes (plan 1 and plan 2 in the choice sets) and 0 for the base (status quo) option.

Afforestation (AFFOR): This attribute represents the number of new trees that will be planted on the new and degraded areas of the park's landscapes. Reforestation is expected to have positive relationship with the utility of the visitors because it enables to restore the degraded floristic make-up of the park and make the park and surrounding areas evergreen and enrich the scenic view of the park and expected to increase the utility level of the visitors.

Wildlife population (WILDLP): This attribute stands for the number of the wildlife living in the park's ecosystem both common wildlife and endemic mammals such as East African Oryx, Soemmerring's Gazelle and Dik-dik. Improving the number of wild animals living in the park in quantity and quality is expected to have positive relationship with the utility level of the visitors.

Additional services (ADSERVICE): This attribute stands for a measure of facilities on a percentage base demanded by tourists to access to the park and while staying on site to enjoy the natural gift of the park's ecosystem both biodiversity and the attractive land view. These services include, provision of information, library/museum, map, toilet, shower rooms, modern swimming pools, lodges and hotels furnished by Wi-Fi, fixed telephone, recreational benches, shops, enough and well trained tour guides and scouts, camping equipment like sleeping bags, mattress and cooking gears, renting transportation like bicycle, motorbike, horses and mules. The provisions of all these services improve the well-being of the visitors of the park. Therefore, general services provision increases the utility of the visitors and expected to have positive relationships with the utility.

Entrance fee (ENTFEE): This is a monetary outlay that visitors are charged in ETB per day to visit the park. It is expected to have negative relationship with the utility level visitors get by visiting the park because an increase in cost decreases the utility of the visitors.

AGE: This variable is visitor‘s age which is measured in years. Generally, a positive relationship is expected between person‘s age and the choice of improved environmental plans. This is because the person‘s interest in environmental improvement increases as s/he becomes older.

Family size (FSIZE): This is family size measured as the total number of people in the visitor‘s household. A negative relationship is expected between FAMSIZE and the probabilities of choosing improved environmental plans; this is because for a visitor with large family size spends

a relatively more proportion of its income on the consumption of composite goods, other things being equal.

Average monthly income (INCOM): This is disposable monthly income of the visitors. Since income reflects the ability to pay, a positive relationship is expected. This is due to the fact those people with higher income can get a better satisfaction by visiting good environmental situation.

Number of years in formal education (EDU): This represents visitor‘s educational level in years of education. More years of education would generally be expected to lead to a better understanding of the importance and benefits of visitation of a natural recreation site and its improvement. Therefore, a positive relationship is expected between EDU and the choice of improved environmental plans.

Sex of respondents (DGEN): This variable represents the sex of the visitor. It is included in the study as a dummy variable, where 1 is for male and 0 for female, to test whether gender of visitors' is an important determinant of choosing the improved plans on the park. This relationship is indeterminate a priori.

1.14.5 Design of a Choice Experiment

There are four stages followed in the design of a choice experiment: (i) definition of attributes, leveling attributes and customization, (ii) experimental design, (iii) questionnaire development and (iv) choice of sample and sampling strategy. These stages should be seen as an integrated process with feedback. The development of the final design involves repeatedly conducting the stages described here, and incorporating new information as it comes along (Alpizar *et al*. 2001). In this thesis work we focused only on the first three stages.

1.14.5.1 Description of Attributes and their Levels

The first step in undertaking choice experiment survey design is to identify the attributes and attribute levels to be included in the survey. Identification of attributes and their levels that helps to describe the impacts of alternative policy scenarios is a major task in a choice experiment methodology (Kragt 2009). The attributes are used to describe the results of continuation of status

quo and what would happen if an alternative were to be introduced. Two perspectives of these results need to be taken into account when identifying relevant attributes. The first one is that the attributes used to describe the alternatives in each choice profile should be relevant to the policy making process. Thus, they should be consistent with the policy tools that are being used to form the results shown in the alternatives. Second, the attributes included must give a sense for the respondents of the questionnaire (Bennett 1999).

Accordingly, determination of the relevant attributes in ANP involved an extensive literature review and discussion with ANP's administrative staff that they are relevant enough in perspective of policy makers and respondents. Furthermore, after the attributes are defined, the range over which they vary must be determined. The attributes must be allowed to vary across levels that are realistic. The range must, however, be sufficiently large to reflect the possible future values the attributes could take under all the policy options being considered (Bennett 1999). In this research project four attributes were identified and set with their respective levels.

Afforestation: the first attribute of the study is afforestation, planting new indigenous trees that easily adapts to the environment of the park. In the area, forest serves as one of the scenery views for tourist attraction in addition to its regular ecosystem services. The ecosystem services provided by healthy forests include protection of water quality, removal of air pollutants, storm water storage, soil formation and retention, pollination of plants and habitat of wild animals (Mates and Reyes 2004). ANP is dry savannah ecosystem which is fragile and can easily be converted to desert ecosystem if it is not properly managed. According to the finding of Habtamu (2014), the major drivers of deforestation and forest degradation in the park were population growth, free grazing, charcoal production and new development projects. He also added that with the current rate of deforestation it will take only 71.5 years for the remaining woodland to be completely lost. Much of the grassland in the north and west of the park is overgrazed, resulting in up to 50% bare soil and rock and the domination of invasive, unpalatable species such as needlegrass are more mixed with some Acacia, cadaba, Psiadia incana and Vernonia. These regular ecosystems services are under question if a great care and conservations are not provided by all the concerned forest nearby communities and legal entities, park management for the protected areas. On account of this, planting different new tress that enables to improve the scenic beauty and habit diversity of the

park was taken as one attributes with three levels: Planting 1000000, 2000000 and 3000000 new trees.

Wildlife population is the second attribute of this study. Wildlife populations in Ethiopia as a general were under continuous threat, despite the presence of parks and protected areas, over the past several decades due to the anthropogenic factors like deforestation, farm expansion and illegal hunting (Tefera 2011). The situation is not different at ANP. For instance, Available census data indicate that the number of Beisa Oryx (Oryx beisa) and Soemmering's gazelle (Gazella soemmerringi) population has declined between 2008 and 2010 at ANP (Chernet 2015). In this regard, protecting the endangered species and increasing their number will attract visitors and likely to be a highly relevant attribute. The levels were 50%, 100% and 150% increase in their number from the current level.

Additional services for the visitors of the park are among the attributes proposed for this study. ANP is one of the naturally enriched protected area harboring diversified flora and fauna. However, the site has failed to provide general services, which might include, information provision, hiring additional guards, outdoor and indoor games, and fast food shops. Some tourists also want to get the services like health and medical treatment, campfire, showers, recreation huts, recreation benches and library/ museum in the meantime and/or at stay place in parallel. Moreover, for many visitors, the additional stress factor that may make the people not to visit the park is the problem of lodge. This is because there is lodge which almost only gives service for foreign visitors as it is so expensive and also there is no enough Tents, Cabin and hotel services to stay overnight within the park. Even though availability of such facilities can enhance the visitors' appreciation of the site and increase the amount of revenue extracted by the site, the site has failed to provide these services in qualified and/or in sufficient amounts. Therefore, providing such services at the site is likely to be an important attribute. The three levels included in this attribute were: Provision of after visiting the park service, Provision of on-site and after visiting the park service, and Provision of to reach the site, on-site and after visiting the park service.

Monetary Attribute: The last and fourth attribute of the study would be the monetary attribute, which is relevant. It is named as a gate fee or entrance fee. The entrance fee, if it is changed from its status quo level, visitors will be able to access to an improved recreational site.

Table 3.1: Description of the attributes and their levels

Attributes	Description	Levels
Afforestation	This program will focus on Planting new native trees on the degraded areas and covering surrounding landscapes which were covered by bush land and other invasive plants. Thus, the park's ecosystem services will be improved.	A. Planting 1,000,000 new trees(Low) B. Planting 2,000,000 new trees(Medium) C. Planting 3,000,000 new trees(High) D. No new plantation of trees*
Wildlife	This will focus on increasing the number of both endemic and common wildlife. Management zones will be developed within the park; creation of core protection area of wild animals and buffer zone in which pastoralists and agro-pastoralists carry out their respective livelihood. Therefore, there will be no space and food competition between wild-life and domestic animals that grassland plain and other habitats will be used exclusively by wild animals. The plan will also focus on the controlling of illegal hunting.	A. 50% increase in the number(Low) B. 100% increase in the number (Medium) C. 150% increase in the number(High) D. No change*
Additional services	In this regard, the plan will need to have improved and well organized additional services for visitors, such as camping equipment, improved roads, on-site resting places (hotels and lodges), transportation facilities within the park and the other mentioned facilities. Thus, Awash National Park will be a corridor of tourist destination.	A. Provision of after visiting the park service[2] B. Provision of on-site and after visiting the park service[3] C. Provision of to reach the site, on-site and after visiting the park service[4] D. No improvement*
Entrance fee	Making entrance fee greater than present level paid by tourists to finance any types of facilities at the park. Using it as a source of fund to support enhanced and improved recreational facilities at the park.	A. 50% increase in the gate fee B. 100% increase in the gate fee C. 150% increase in the gate fee D. No change (current level)*

[2]*which includes library/museum, construction of additional lodges, hotels and camping equipment like tents, cabin, sleeping bags, mattresses, cooking gears.*

[3] *which includes health and medical treatment, trained tour guides and scouts, protected tourist zone, shops, showers, swimming pool and traditional transportations, and library/museum, construction of additional lodges, hotels and camping equipment respectively.*

[4] *which includes information desk, improved infrastructure and map, and health and medical treatment, trained tour guides and scouts, protected tourist zone, recreation benches, shops, showers, swimming pool and traditional transportations, and library/museum, construction of additional lodges, hotels and camping equipment respectively.*

An asterisk (*) indicates that it is the status quo.

1.14.5.2 Experimental Design

Experimental design is the paramount stage in the choice experiment designation process. It deals with ways of creation of choice set in an efficient way, i.e. it is the process of combining attribute levels into profiles of alternatives and formation of choice sets. The standard approach and most commonly used experimental design is the so called orthogonal design, where the variations of the attributes of the alternatives are uncorrelated in all choice sets. The creation of experimental design involves two steps: first obtaining optimal combinations of attributes and their levels to form alternatives and the second step involves combining of alternatives together to form the complete choice sets. Commonly, choice sets comprise a constant base or status quo option and two or more alternatives that involve varying attribute levels (Alpizar *et al*. 2001).

In this thesis work, four attributes will be identified for experimental designation. The attributes considered were afforestation, wildlife population, additional services and entrance fee with their respective levels. All attributes have three levels and results in a full factorial with eighty one possible combinations could be formed (3^4 =81). The full factorial design may lead to very large combinations which could not be tractable and more than the respondents could be expected to cope up. In such cases, there is a need to choose a subset of possible combinations to be included in a choice set.

Based on this, while estimating the economic benefit of the semen mountain national park using choice experiment method, Ali (2011) created five optimal choice sets using SAS in orthogonal design method using the OPTEX procedure, from the eighty one possible combinations. This combination of optimal choice set were adopted for this study too. Each respondent was asked to complete five consecutive choice sets with three alternatives (plans). One of the choice sets provided to respondents is given in Table 3.2 as an example:

Table 3.2 Sample choice set
Choice set: Which plan would you choose for Awash National Park?

Attributes	**Option 1**	**Option 2**	**Option 3 (status quo)**
Afforestation	Planting 2,000,000 new trees	Planting 2,000, 000 new trees	No change
Wildlife	150% increase in their number	50% increase in their number	No change
Additional services	Provision of on-site and after visiting the park service	Provision of after visiting the park service	No change
Entrance fee	50% increase	150% increase	No change
I prefer (please tick in the box)	☐	☐	☐

1.14.5.3 Questionnaire Development

Developing the questionnaire is the third issue in designing choice experiment. It involves preparation of general questions and choice experiment questions that will be provided to the respondents. Most CE surveys open with introduction aimed at (i) making the respondent comfortable with answering questions in a survey, (ii) guiding the respondent into the topic of the survey, and (iii) to inform the objective of the survey.

The questionnaire for choice experiment were classified into four parts. The first part include questions about socioeconomic status of the respondents. These typically include the respondent‘s age, gender, household income, marital status, occupation, number of dependents, nationality, and educational attainment. This is followed by questions on general perception and observations about the park for the respondents. These questions focus on investigating visitors’ attitude and their observations with regard to the site (especially general sentiments regarding the environment).

The next part of the questionnaire consists of the choice experiment questions. There are five choice sets with three options each one of which is the status quo option. Before the choice experiment exercises, the choice scenario description was presented to the respondents. The description was about features of Semen mountain national park, about the attributes and their levels, and about payment vehicle. This description was aided with pictures that could explain the

attribute levels in an option. Then the choice sets are presented to them and they were showing pictures which could elaborate the alternatives in a given choice set.

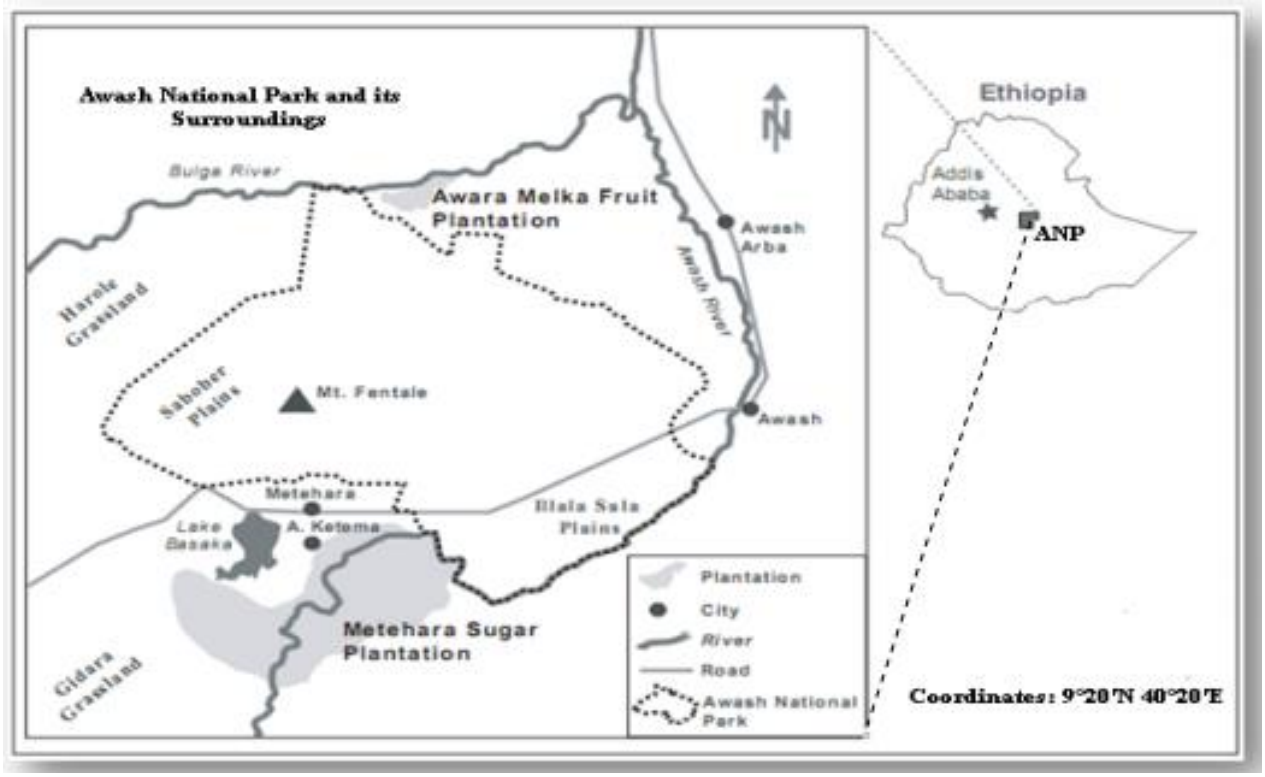
CE questions are usually followed by follow-up questions designed to explore the motivations behind respondent‘s choices and understanding the reasons whether respondents were or were not willing to pay for the proposed hypothetical programs. These questions are important to identify protest’ responses, that is, responses of people that did not engage in the trade-off exercises. Follow-up questions are further aimed at explaining respondents’ views of the hypothetical programs they evaluated. These questions help for assessing the credibility and meaningfulness of the CE exercises. In the appendix, see the full description of the questionnaire and the scenario.

1.15 Description and Identification of the Site

Awash National Park (ANP) is one of the oldest national parks of Ethiopia that are under the jurisdiction of the Ethiopian Wildlife Conservation Authority (EWCA). It is found 215 Km east of Addis Ababa and lies at the trans-boundary of Oromia and Afar Regions. The Park covers 756 square kilometers.

The park is one of the first two gazetted National Parks (with the Simien Mts National Park) in Ethiopia and was established in 1958. It is one of the most undeveloped protected areas in the Horn of Africa with extraordinary biodiversity. Its proximity to the capital Addis Ababa and its wildlife diversity, fantastic scenery and rich cultural heritage make it one of the most attractive conservation areas to visit and enjoy. It has some extraordinarily natural attractions including the Awash River Falls, the hot springs, Mt. Fantale, and the Hyena Park, dormant volcano with pumis slopes and ancient lava flows that provide roosts for a large bat population, smaller carnivores, and reptiles (Ayinalem 2014).

Figure 3.1: Awash National Park Location and its surroundings



The temperature in the park is hot and can reach as high as 42°C. Grassland, savanna, and shrubland dominate the park. Much of the grassland in the north and west of the park is overgrazed. The major mammal species conserved in the park are the Beisa Ory, Soemmering's gazelle, Lesser kudu, Greater kudu, Defassa waterbuck, Salt's dik-dik, Abyssinian Hare, Warthog, Anubis baboon, Hammadryas baboon, Lion, Leopard, Aardwolf, and Bat-eared fox. The ANP is an important bird area (IBA) with over 460 species among which six are endemic, five vulnerable and three near threatened species. Just over 60% of the total migratory bird species listed in Ethiopia are also found in the park. There are also 43 species of reptiles (Daniel 2011).

The community surrounding the park lead pastoralist mode of life where their main stay relays on the income gained from animal selling. Ethnically they belong to Itu, Kereyu and Afar groups.

CHAPTER FOUR

RESULTS AND DISCUSSION

The main objective of this section is to determine individuals' willingness to pay for the total economic value of ANP. To estimate the total economic value of the site, travel cost and choice experiment methods have been used. The survey was conducted to collect information on WTP and the socio-economic characteristics of the respondents. This section presents the important findings and results obtained from the sample survey. The regression results are presented in like manner.

1.16 Descriptive Statistics

According to the data of the office of Awash National Park administration of the 2016/2017, the tourist flows in the park's ecosystem area was about six thousand fifty five (6,055). Among these visitors three thousand three hundred twenty nine (3,329) were foreigners and two thousand seven hundred twenty six (2,726) were domestic visitors. The figure shows that from the annual tourist flow of ANP nearly 55% were foreigners. Local visitors came from various parts of the country including visitors from the town of Adama, Addis Ababa and Dire Dewa. Whereas foreign visitors were from Europe, America and Asia. At a country level, most of the visitors were from Italy, England, Israel, Spain, France, German and Belgium.

The questionnaire was organized in to four sections so as to collect data on socio-economic characteristic, travel and on-site information, general perception and observation of the site and choices for various measures affecting the recreational quality of the site. The study is conducted based on a sample of 98 foreign and 97 local visitors.

Out of the total visitors, males are 121 and females are 74 comprising 62.1 percent and 37.9 percent respectively. The mean family size of the respondents was calculated to be 2.5. In addition, the mean age of the respondents was 41.6 years old. The mean years of education were 14 years. As far as income is concerned, 81 percent of the respondents are full time employee and thus earn their own income. The mean income of visitors was ETB 49,400 per month.

Total numbers of annual visits to the area and travel costs per trip are the two important variables that were used to determine the value of the recreation area under consideration. Thus, visitors were asked their number of visits to ANP for the last 12 months. The average number of annual visits, and travel costs per round trip were reported to be 1.43 and ETB 555.42 respectively.

Out of the total sample of 195 visitors, 121 (62.05%) were males and 74 (37.95%) were females. In the past, women were mostly engaged in domestic chores and hardly got the opportunity to visit recreational areas. The rise in the number of females in the recreational areas as visitors is an indicator of change in the society‘s attitude toward the gender division of different activities.

Generally speaking, couples spent most of their leisure time in recreational areas. This study also shows that 44.1% of the visitors are married, whereas single and divorced visitors together accounted 55.89%.

Usually individuals are more interested to organize travel by groups. Here, out of the total respondents, 74.8% of the individuals visited the park in groups, with the rest of them (25.2%) coming to the park individually. It is also worth noting that 158 (81%) sample respondents were full time employee.

The researcher divided the total recreational (enjoyment) experience of visitors in to two. i.e; on-site recreational experience and travel recreational experience. Thus, there were questions that requested respondents to estimate their total recreational experience from Awash Park. Accordingly, in average, 86 percent of respondent’s recreation is for being on the site and the remaining 14 percent recreation is for travelling to the site. This was a good indication that most of the respondents considered in this study were pure visitors (not meanderers).

Table 4.1. Descriptive Statistics of the socioeconomic characteristics of visitors (n=195)

Variable	Mean	Std. Dev.	Min	Max	Observation
Frequency of Visits	1.43	0.83	1	6	195
Travel cost (ETB)	555.42	4,934.75	110	17867	195
Travel cost (ETB) that would be incurred to visit substitute site	678.56	8,834.57	250	27150	195
Age	41.57	11.86	18	69	195
Formal education	14.01	3.57	3	21	195
Family Size	2.47	1.24	1	6	195
Monthly Income (ETB)	49,400.3	49,808.15	0	271,855	195
Previous acquaintance with the site	15.27	8.49	1	40	195
Sex of the visitor	121=Male and 74=Female	0.49			195
Marital status	86=Married and 109=otherwise	0.50			195
Group or Alone?	49=alone and 146=group	0.43			195
Mode of Transport	25=own car and 170=otherwise	0.34			195
Nature of Employment	158 =fulltime employee and 37 = otherwise	0.40			195

Source: Computed from the survey data

1.16.1 General Perception and Observation about ANP

As far as the perception of the visitors about the quality of recreational site is concerned, most of them rated it as good. Respondents were also asked to rank major problem of the site. Majority of the respondents ranked the forest and landscape degradation of the area as the first problem in reducing the recreational quality of the site. This is due to the fact that the Park's quality is deteriorating mainly because of road construction, widespread deforestation and grass burning, agriculture, firewood collection, hunting and domestic livestock grazing.

Difficulties of access roads within the Park and Severely hot temperature ranked second and third, respectively, by sample respondents in reducing recreational quality of the park. Lack of services like provision of information, rented transportation and unavailability of fast food shops

are the fourth major problem mentioned by the respondents. The price of food and drinks at the recreation site is so expensive and unaffordable for most domestic users. Lack of modern swimming pools and toilet facilities, Lack of protected tourist zone and Lack of appropriate resting facilities around forty springs and hot springs are the fifth, sixth and seventh problems respectively ranked by the respondents. These responses are good evidences to undertake the study that designs improvement plans relative to the current situation. The responses are summarized in table 4.2 below:

Table 4.2 Major Problems at the Site in Reducing Recreational Qualities

	Forest and landscape degradation of the area		Lack of protected tourist zone		Lack of appropriate resting facilities		Difficulties of access roads within the Park		Lack of modern swimming pools and toilet facilities		Lack of services i.e, info provision, fast foods, rented transportation		Severely hot temperature	
degree	Freq.	%	Freq.	%	Freq.	%	Freq.	%	Freq.	%	Freq.	%	Freq.	%
1st	**64**	**32.8**	13	6.7	4	2.1	28	14.4	16	8.2	24	12.3	46	23.6
2nd	41	21.0	12	6.2	6	3.1	**76**	**39.0**	5	2.6	24	12.3	31	15.9
3rd	33	16.9	13	6.7	6	3.1	32	16.4	12	6.2	40	20.5	**59**	**30.3**
4th	29	14.9	15	7.7	30	15.4	12	6.2	0	-	**70**	**35.9**	39	20.0
5th	9	4.6	36	18.5	40	20.5	13	6.7	68	34.9	16	8.2	13	6.7
6th	3	1.5	**54**	**27.7**	42	21.5	34	17.4	49	25.1	9	4.6	4	2.1
7th	16	8.2	52	26.7	**67**	**34.4**	0	-	45	23.1	12	6.2	3	1.5
Total	195	100	195	100	195	100	195	100	195	100	195	100	195	100

Source: Computed from the survey data

1.16.2 Visitors' attitude toward park

From table 4.3, it can be observed that attitude which measures the respondents toward the characteristics of this particular park in making a trip decision to it. It actually explains the level of the attractiveness of the site. The attractiveness level is measured based on individual visitors believe. Based on this, 'extremely bad', 'very bad' and 'bad' options were not rated at all. From the given seven options, 'average (adequate)' scored the minimum. Which is 2%, 1% and 2% by the local, foreign and total sample visitors respectively. Maximum score (excellent) was rated 54%, 55%, 54% by local, foreign and total sample visitors respectively. More than half of respondents rated ANP as very good. Which make it the most rated attitude measurement option.. This implies that the park has good tourism potential.

Table 4.3 Visitors' attitude toward park

NO.	Attitude Measurement Options	Local Visitors		Foreign Visitors		Total	
		freq	Percent	freq	Percent	freq	Percent
1	Extremely Bad	0	0%	0	0%	0	0%
2	Very Bad	0	0%	0	0%	0	0%
3	Bad	0	0%	0	0%	0	0%
4	Average(Adequate)	2	2%	1	1%	3	2%
5	Good	31	32%	22	22%	53	27%
6	Very Good	52	54%	54	55%	106	54%
7	Excellent	12	12%	21	21%	33	17%
Total		**97**	**100%**	**98**	**100%**	**195**	**100%**

Source: Computed from the survey data

1.16.3 Park's attribute affecting visitor's decision

Respondents were asked the statement that best described the reason why they made their choices in answering the choice set questions. All of the respondents have answered the follow up questions presented after the choice experiment exercises. To see if there is divergence of interest between local and foreign visitors, the follow up questions were separately analyzed. Accordingly, from table 4.4 below, we can deduce that though the weight differ both groups interest gone in the same direction.

From sample visitors, more than 42 percent replied that they understood wildlife population attribute is important and that they gave priority to choose the highest level of this attribute. About 24 percent of them made their choices they understood that afforestation attribute is important and that they gave priority to choose the highest level of this attribute. Only 2 percent of them chose the status quo option because of an objection to the amount of entrance fee. The results are presented in the following table.

Table 4.4 Park's attribute affecting visitor's decision

	Follow up Questions	Local visitors		Foreign visitors		Total	
		Freq	%	Freq	%	Freq	%
1	I chose the status quo option because of an objection to the amount of entrance fee	3	3%	0	0%	3	2%
2	I understood that afforestation attribute is important and that I gave priority to choose the highest level of this attribute	20	21%	26	27%	46	24%
3	I chose the cheapest option whatever its level is.	5	5%	3	3%	8	4%
4	I understood that wildlife population attribute is important and that I gave priority to choose the highest level of this attribute	34	35%	47	48%	81	42%
5	I understood that additional services attribute is important and that I gave priority to choose the highest level of this attribute	19	20%	15	15%	34	17%
6	I agree to pay because the payment is a reflection of the value of recreational quality.	16	16%	7	7%	23	12%

Source: Computed from the survey data

1.17 Econometric Results

The econometric model presented in this section attempts to make some analysis and make inferences based on the information obtained from the sampled respondents. These econometric methods are employed to estimate consumer surplus of the visitors and mean WTP of the respondents using TCM and CEM, respectively which would help to find the total economic value of the study area.

1.17.1 Travel Cost Method Results

Recreational demand function at a given site is related to the number of trips made by an individual and trip price or personal preference. The non-negative and integer nature of trip demand suites the count data model to estimate recreational benefits. The application of count data model to assess recreation site demand by adopting on-site survey encounters the problems of asking the frequency of visits and truncated non-user samples. So, the study used on-site truncated model to correct for these two evaluation problems. Moreover, the study employed log log functional form to estimate the recreational demand of the site. The total travel cost and other socio-economic variables are included in the model as independent variable. Total travel cost contains transportation costs of visitors and opportunity cost of time. Without estimating travel time for a recreation site, the consumer surplus of benefits would be underestimated. These costs were multiplied by 2 to get the total round-trip costs. The functional relationship that was presented in equation (5) is re-written here below:

$$\begin{aligned}\ln(NOV)_t = \beta_0 + \beta_1 ln(TC)_t + \beta_2 ln(STC)_t + \beta_3 ln(AGE)_t + \beta_4 ln(EDU)_t + \beta_5 ln(FSIZE)_t \\ + \beta_6 ln(INCOM)_t + \beta_7 ln(KNOW)_t + \beta_8 (DGEN)_t + \beta_9 (DMARS)_t \\ + \beta_{10} (DMOT)_t + \beta_{11} (DGRP)_t + \beta_{12} (DEMP)_t + \varepsilon_i\end{aligned}$$

NOTE:

- For computational reason one trip is added to all visitors. There are some visitors who made only one trip and if one trip is not added to these values its logarithm will be zero and which cannot be computed using truncated count data model. Therefore, for

computational reason one trip is added to all visitors. This procedure was used by Andualem (2011) in estimating the economic value of Addis Ababa lions zoo park

- The travel time cost is converted to ETB (Ethiopian Birr) after multiplying hourly income by one fourth (1/4*hourly wage*travel time in hour) as opportunity cost for the time spent on travel only.

The primary aim of individual travel cost method is finding recreational demand benefits and computation of consumer surplus for each recreational trip. The appropriate recreational demand function is derived from the regression result between the expected number of trips and travel cost. The regression result from truncated model is presented in table 4.5 below.

Table 4.5. Estimation Results of the Truncated Model for Travel Cost Method

Explanatory variable	Expected coefficient Sign	Truncated coefficient	p-value	Marginal Effect	Mean Value
lnTC	-	-0.061 (.024)	0.010**	-0.061	555.42
lnSTC	+	0.065 (.026)	0.012**	0.00035	678.56
lnAGE	-	0.196 (.065)	0.003***	0.195	41.57
lnEDU	+	0.284 (.061)	0.000***	0.282	14.01
lnFSIZE	-	-0.077 (.031)	0.012**	-0.076	2.47
lnINCOM	+	0.055 (.025)	0.028**	0.055	49,400.3
LnKNOW	+	0.076 (.024)	0.002***	0.076	15.27
DGEN		0.01 (.31)	0.731	0.01	.6205
DMARS		0.041 (.034)	0.228	0.041	0.441
DGRP		0.011 (.038)	0.768	0.012	0.749
DMOT		0.140 (.047)	0.003***	0.142	0.128
DEMP		-0.066 (.040)	0.100*	-0.067	0.810
Cons		-1.341 (.497)	0.007	-1.341	
Summary Statistics	Log likelihood = 32.28644 Wald chi2(11) = 149.15 Prob >chi2 = 0.0000 Number of observation = 192				

Source: Computed from the survey data

* Significant at p<0.1; ** Significant at p<0.05 and *** Significant at p<0.01

→Numbers in parenthesis are standard deviation

The overall significance of the model was tested using the log likelihood ratio test. Because the log-likelihood ratio (LR) test is formally more preferred to test the significance of the model (Andualem 2011). The log-likelihood ratio test estimated as follows:

$$LR = -2(Restricted\ log - Unrestricted\ log)$$

Where the restricted log is the log-likelihood only with constant and the unrestricted log is the log-likelihood of the full model. The calculated LR chi $^{2}(11)$ is 149.15 and the critical value of the test with 11 degrees of freedom ($\chi 2_{11}$) at one percent significant level is 24.72. The calculated value is higher than the tabulated value at one percent significant level. Therefore, the likelihood ratio statistic test models goodness-of –fit under the null hypothesis that all parameters are zero can be rejected.

1.17.1.1 Determinants of Recreational Demand

The demand function of the independent variables includes Travel cost, the cost that would be incurred to visit substitute site, age, formal education, family size, income, acquaintance with the site, marital status, group travel, mode of transport and employment. It is expected that travel cost, age and family size are negatively correlated with the number of visits and the rest other than dummy variables were expected to positively correlated with the number of visits.

All of the estimated coefficients have the expected signs, except age and they are in conformity with the theories suggested in recreation economics. The variables Age, Education, Acquaintance with the site presents statistically significant at 1 percent level, which imply they are important determinants of a recreation demand of the site. These variable has also positive sign which suggest that as the number of years of education, age and acquaintance with the site increased, awareness to this kind of goods increase and there by visitation may follow the same direction. Mode of transport (DMOT) is also significant at 1 percent level.

The variable travel cost is also important determinant at five percent level of significance and got negative sign. The travel cost negative coefficient is consistent with the demand theory, which stipulates that when the price of travel increases then the number of visits will decrease. The

negative sign is expected because as the costs of travel to the site increase, one is expected to take fewer trips per annum, ceteris paribus.

The income variable also has significant impact on recreational demand and bears the expected positive sign. Respondents with higher incomes are willing to take more trips to the park. The implication here is important; as incomes increase overtime, so too will recreational demand.

The cost of accessing a substitute site (STC) has got a positive sign in the trip demand function as generally expected according to demand theory. Furthermore, the variable family size, mode of transport and weather the visitor is full time employee or not are also significant determinants.

On the other hand, the variables that represent marital status (DMARS), sex of respondents (DGEN) and whether the trip was made by group or not (DGRP) are found to be statistically insignificant determinants of visit to the park.

The results of marginal effect on table 4.5 above are interpreted as elasticities of demand for visits. For instance, the TC variable indicate that, other things held constant, when travel cost increases by one unit, visitations to ANP will decrease by 0.061. Likewise, the variable INCOM indicate that when an individual's income increases by one unit, ceteris paribus, visits to ANP will increase by 0.055.

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. For instance, Mesfin (2010) carried out a study in wondo Genet recreation area by using TCM. In line with the finding of this study, he found out that travel cost was negatively related to the number of visitation rates. Cost to visit substitute site, education, monthly income and acquaintance with the site were positively related with number of visit. Group travel and sex of visitors were statistically insignificant. On the other hand, Contrary to the finding of this study, he found that age, mode of transport and employment were not statistically significant determinant of visitation rate.

1.17.1.2 Estimation of the Demand for the Recreational Experience and Welfare Calculation

Basically there are two steps to arrive at the final welfare of the visitor. The first step is estimating the demand relationship for the recreational benefit. To calculate recreational benefit, a simple demand function can be estimated by using the coefficients and the mean values of significant variables reported in table 4.5. The estimated demand function takes the following form.

$$lnV_{ij} = \alpha_0 + \alpha_1 lnTC_i + \varepsilon_i \text{ ---------- (18)}$$

Where lnV_{ij} represents logarithm of individual i's annual visit to site j, and TC_i is logarithm of individual i's travel costs per trip. Where ε_i is residual and which has a normal distribution with mean zero and variance δ^2. The value of the constant term (α_0) is 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. α_1 is the coefficient on the TC variable in the table. By using the coefficients and the mean values of variables on table 4.5, the demand function is estimated as:

$$lnV_{ij} = 6.3216 - 0.061\ lnTC \text{ ---------- (19)}$$

To estimate the annual recreational benefit of ANP per person and then in aggregate, it is important first of all to transform the above demand function in to its inverse form. When the above demand function is transformed, it takes an exponential functional form (see equation 20). Then the area under the demand curve is the recreational benefit of the site.

$$V_{ij} = \frac{e^{6.3216}}{TC^{0.061}}\ \{TC > 0\} \text{ ---------- (20)}$$

Now, integrating the inverse demand function (equation 20) between zero and mean trip of 1.43, it is possible to estimate the recreational benefit obtained from the park. Thus, the estimated recreational benefit for the average number of visits is ETB 829.146. The recreational benefit of Awash Park per visit per person is, therefore, estimated at ETB 579.822.

For an obvious reason, all of this recreational benefit cannot be attributed to the on-site experience. Hence we need to find a technique to evaluate how much of this benefit can

justifiably be said to have been purely related to the on-site experience. The usual method is asking visitors to allocate percentage points to the on-site and off-site experience to evaluate how much of the utility of the whole recreational experience is due to the on-site experience (Willis and Garrod 1997; Mesfin 2010). In this study a similar procedure was followed, i.e. visitors were asked to allocate their total enjoyment in to travel and on-site experience (see question 2.12 of section II in the questionnaire). The mean value for the on-site experience was calculated to be 86 percent, and hence per visit per person benefit for the on-site experience was estimated as ETB 498.647.

The aggregate annual on-site recreation value of the park is the multiple effect of number of visitors registered within a year and recreation benefit per person per visit. Considering an average annual visits for last six consecutive years of 10,003, according to data obtained from the site, the annual estimates for per person recreational benefit can be translated in to expected total on-site recreational benefit of ETB 4,987,965.141 per annum.

In a previous six consecutive fiscal year the average revenue generated from visitors of the park is ETB 605,300. As compared to the total annual benefit estimation result obtained from recreation activities, the figure shows that the revenue collected from total aggregate benefit of the park is only around 12.135%.

Once the demand function has been estimated, the consumer surplus provides an approximation of the welfare associated with visiting the site. Formally, based on the demand function equation, a consumer surplus from the recreation is the area below the visit demand curve and above the average travel cost (Nakatani and Sato 2010). Estimation of the demand function and consumer surplus for the actual visitors is done using the count data model.

Using the exponential demand function in equation (20), 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 ETB 555.42. Thus, individual consumer surplus (CS) per visit was approximated to ETB 330.12. This consumer surplus per visit can be translated into aggregate consumer surplus for the total number of 10,003 visits for the average number of visit for six consecutive fiscal period before the survey, which was approximated to ETB 3,302,190.36.

Despite geographical, visitors and time frame differences, it is possible to compare recreation site benefit valuation studies conducted in Ethiopia with Awash National park benefit estimation. In this regard Sitotaw (2003) attempted to value the benefit of outdoor recreation in Langano using the travel cost method: the case of Wabi-Shebele Langano recreation site. Thus, the total annual on-site recreational benefit of the site was estimated to be ETB 8,685,774 and Ali (2011) conducted study in Semen Mountain National and the result from Semen Mountain National Park show that an aggregate annual recreational economic benefit was ETB 48,562,086.4. Mesfin (2010) also estimated the recreational value of wondo genet recreational site using TCM and the estimation result shows that total on-site recreational benefit of the site is ETB 7,899,301 per annum. Moreover, Abijata-Shalla Lakes National Park was also estimated using individual travel cost method by Fisseha (2014). Based on the analysis total annual on-site visitors recreational demand was estimated to be ETB 40.4 million during the study period.

As compared to findings of other study, the estimated aggregate recreational benefit of Awash Park is below those of other sites. This may be because, research assumptions and procedure followed and site characteristics in these sites to some extent differing to one another. Another possible reason for small recreation value in this study may be due to very low annual tourist flow to the site.

1.17.2 Choice Experiment Results

Before turning to the results, it is worth noting that in the survey 195 visitors answered the choice questions. Only 2 percent of the visitors choose the current situation (status quo option) indicating that the majority of the respondents want a policy change.

The data were coded according to the level of the respective attributes. Thus, for wildlife population 50% increase in their number was coded as 1; 100% increase in their number was coded as 2 while 150% increase in their number was coded as 3. For additional services, provision of after visiting the park service was coded as 1; provision of on-site and after visiting the park service was coded as 2 while provision of to reach the site, on-site and after visiting the park service was coded as 3,. For the attributes – afforestation and entrance fee, their values were entered directly. The status quo levels were coded as 0 for all attributes except for entrance fee

which is given as 90, 50, and 20 Ethiopian Birr for non-resident foreign, resident foreign and local visitors respectively (these were the fees that are charged for entrance). Here the entrance fee was specified for each respondent according to the increase in percentage by using the status quo level as a base. The ASC were equal to 1 for the alternative with improvement in the attributes i.e., for plan 1 and 2 and 0 for the status quo (plan 3).

These constants can be thought of as representing all other determinants of utility for each option not captured by the attributes. They are not related to specific attributes so they cannot easily be used to predict the effects of changes due to changes in attributes. ASCs do however improve the overall model performance and should therefore be included in the estimation (Adamowicz and Boxall 2001).

Using 485 and 490 observations elicited from 97 foreign and 98 local respondents respectively (i.e., each respondent was provided with 5 choice sets), the multinomial logit models with linear specification in attributes was estimated using LIMDEP 7 for the basic and extended models (include individual covariates). In table 4.6, the parameter estimates for the basic and extended multinomial logit model are shown, which are represented as model 1 (basic model) and model 2 (extended model). In addition to this, the random parameter logit model was estimated to address unobserved preference heterogeneity and possible violation of the IIA assumption.

1.17.2.1 Result of multinomial Logit Model

The estimates of the multinomial logit model are presented in two models, as model 1 which consisted of the attributes only and model 2 which includes the socioeconomic variables and its results are given in Tables 4.6.

Table 4.6 Estimation results of the multinomial logit model for the choice experiment method

Variables	Model 1 (Attributes only)		Model 2 (Attributes and Socioeconomic Character tics)	
	Coeff. (P-value)	Std.err.	Coeff. (P-value)	Std.err.
ASC	14.32611 (0.997)	3611.667	126.9025 (0.961)	2604.296
AFFOR	7.26e-06 (0.000)***	1.81e-06	.0000142 (0.006)***	5.12e-06
WILDLP	3.125694 (0.000)***	3.125694	6.317847 (0.019)**	2.686173
ADSERVICE	2.313848 (0.002)***	3.313848	4.900046 (0.027)**	3.884019
ENTFEE	-.0533634 (0.004)***	-0.0533634	-.099146 (0.037)**	.0474949
ASC*AGE			.8767491 (0.122)	.5667094
ASC*EDU			5.248951 (0.017)**	2.201393
ASC*FSIZE			-.2515708 (0.740)	.7580862
ASC*INCOM			.0001639 (0.073)*	.0000914
ASC*DGEN			5.551088 (0.126)	3.630098
ASC*DMARS			1.561303 (0.508)	2.358771
Summary Statistics	Log-likelihood = -24.692694 Pseudo R2 = .7876 Number of obs. = 975		Log-likelihood = -10.074065 Pseudo R2 = .8134 Number of obs. = 975	

Source: Computed from the survey data

* Significant at p<0.1; ** Significant at p<0.05 and *** Significant at p<0.01

The overall explanatory power can be assessed using the McFadden's (pseudo R2) which allows us to compare the fit of different models. The larger the value of pseudo-R2, the better is the fit of the model to the observed data (Birol *et al*. 2006). Accordingly, in this study the reported R2 statistic is adequate compared to what is considered to be the standard. In this study the extended model (model 2) has relatively better explanatory power than the basic model in both criteria. Therefore, the inclusion of the socioeconomic variables improves the explanatory power of the model.

In both model 1 and model 2, the three attributes (afforestation, wildlife population and additional services) have the expected positive signs. In model 1 coefficients of all attributes are statistically

significant at 1%. In model 2 afforestation is statistically significant at 1% the rest two attributes are at 5% level. These implies that those three attributes are important determinants in the choice of the park‘s resource management.

According to the results, there is no difference between the basic model and the extended model with regard to the coefficients of the attributes in their sign. The positive signs of the coefficients mean an improvement of these attributes can increase the utility of the respondents. In other words, estimated coefficients with a positive sign imply that a change from the status quo option to the corresponding attribute increases the probability of choosing improvement plans over the status quo. In particular, visitors gave value for park improvement plans which result in greater number of wildlife, new plantation of trees around the degraded areas of the park and also provisions of more improved services at the park. In other words, ceteris paribus, an improvement in any single attribute increases the probability of choosing the improved plan.

In the extended model (model 2), the coefficient of the wildlife population attribute is greater than that of afforestation and additional services attributes which indicates that visitors give relatively greater emphasis to the increase in the number of wildlife animals.

The monetary attribute ―entrance fee has the expected negative sign, which is in agreement with the hypothesis that cheaper plans are preferred to more expensive plans after other characteristics are held constant. The negative coefficient of price, means that the respondent‘s utility was lower for an option having a higher price and also it is statistically significant at 1% level for model 1 and 5% level in model 2(extended model). Moreover, we may note that since the given attributes have not fully captured (explain) all variations in choice observations, the coefficient of ASC became positive.

The extended model represents the interactions of the socioeconomic characteristics with ASC. Among the co-variants age, family size, gender and marital status are statistically insignificant. This implies that the involvement of these variables is not a significant factor in affecting the probability of choosing the improved plans. The negative coefficient of family size was expected but it is insignificant.

But the coefficient of interaction of ASC with years of education are positive and statistical significant at 5% level implying that as years of education increases, the probability of choosing the improved scenario options increases, ceteris paribus. In addition to this, the coefficient of interaction of ASC with income is positive and statistical significant at 10% level implying that the probability of choosing the improved option is higher as income increases, other things being constant.

1.17.2.2 Result of Random Parameter Logit Model

As clearly indicated in chapter three, the MNL model necessarily involves strong assumptions about IIA property which states that for any individual, the ratio of probabilities of choosing between two alternatives in the choice set is independent of the presence of attributes of any other alternative in that choice set. Accordingly, the MNL should not be used if the IIA assumption, which results from the IID assumption (constant variance), is violated. According to Alpizar *et al.* (2001) there is another problem with the MNL specification i.e., there is a limitation in modeling variation in taste among respondents. This problem arises due to observed and/or unobserved heterogeneity. Observed heterogeneity can be incorporated into the model by allowing for interaction between socioeconomic characteristics and attributes of the alternatives or ASC terms but it could not detect unobserved heterogeneity.

Thus, the RPL model, which does not require the IIA assumption, can be used as an alternative method of estimation which can also account for unobserved heterogeneity in preferences across respondents. The results of RPL model sampled visitors are reported in Table 4.7:

Table 4.7 Results of the RPL Model with attributes only

Variables	Coeff. (P-value)	Std.err.
ASC	**13.56539** (0.8631)	0.1.20921
AFFOR	**4.78e-06** (0.0003)***	0.9843e-07
WILDLP	**3.21093** (0.0042)***	0.30097
ADSERVICE	**0.8168971** (0.0199)**	0.23802
ENTFEE	**-0.09890300** (0.0473)**	0.02580
Summary Statistics	Log-likelihood = -36.266994 Pseudo R2 = .8749 Number of obs. = 975	

Source: Computed from the survey data

* Significant at p<0.1; ** Significant at p<0.05 and *** Significant at p<0.01

There is no difference between the MNL model and the RPL model with respect to the sign of the coefficients of the attributes. All the attributes are significant in the RPL as in the MNL model. As compared to the previous models, the overall explanatory power of this model, which is given by pseudo R2, is better. The pseudo R2 in this case is 0.8749 and which are better than the respective values for the MNL model.

1.17.2.3 Estimation of the Marginal Willingness to Pay

Right after the estimation of the parameters, the objective of using the discrete choice models is to calculate amount of money respondents are willing to give up to get some benefit from doing certain action such as visiting the natural recreational area. Such monetary measures are known as willingness to pay (WTP) or implicit price. In discrete choice models such as Multinomial Logit and Random Parameter logit models, the coefficients cannot be directly interpreted as the direct effects of the respective explanatory variables on the probability of choosing improvement plans. Rather, they show the direction of effects of the explanatory variables on indirect utility function, which can be used to calculate the mean willingness to pay estimates for each attributes (Birol *et al.* 2006).

In simple linear model WTP measures are calculated as the ratio of two parameter estimates, keeping other things constant. Implicit price refers to marginal willingness to pay for each improvement program. If at least one attribute is measured in monetary value, the ratio of the two parameters would give a financial indicator of WTP (Bennett 1999).

The implicit prices can also be used to identify which attribute is more important to the respondents, which can be used by policy makers to assign more resources in favor of the attributes which have higher implicit prices. Using the coefficient of the attributes from the results of the RPL model, the marginal willingness to pay (MWTP) which is calculated as the ratio of the coefficients for the attribute of interest and that of the monetary attribute, is estimated by using equation (14) and the results are reported in Table 4.8

Table 4.8 Estimates of Marginal WTP (in ETB) for each attribute

Variables	Coeff.(P-value)	St.err.
Afforestation	0.0178106 (0.017)**	1.34e-08
Wildlife population	0.040008 (0.003)***	.0074896
Additional Service	0.0138137 (0.0811)*	.0104898

Source: Computed from the survey data

* Significant at p<0.1; ** Significant at p<0.05 and *** Significant at p<0.01

The estimation of marginal willingness to pay was calculated using delta method immediately after the estimation of Random Parameter model. The rationality of calculating WTP from the coefficients of RPL model is due to accuracy and realistic nature of the model when it is compared with Multinomial Logit model.

Table 4.8 above shows the marginal willingness to pay. Each attributes is statistically significant at different level of significance. This shows that the visitors have positive willingness to pay for each improvement levels of the attributes in quality and quantity. WTP of afforestation and additional services attributes are significant at 5% and 10%, respectively whereas wildlife population attribute is significant at 1%. As it is reported on table 4.8 above, the marginal willingness to pay for afforestation is .0178106 ETB per visit per individual, keeping other things constant. This much payment is for each extra increment of one plant coverage of the degraded

area of the park from the status quo level. The marginal willingness to pay for every additional increment of wildlife population and additional services levels are valued to be 0.040008 ETB and 0.0138137 ETB per visit per individual respectively, keeping other factors unchanged. From these values, visitors' MWTP for wildlife population is higher than that of afforestation and every additional service, and in turn MWTP of afforestation is higher than that of additional services, ceteris paribus. Hence, these visitors valued wildlife population first, afforestation second and additional services third, respectively. Which is coherent result with the result of follow up questions.

1.17.2.4 Estimation of the Compensating Surplus/ Welfare Measures

The marginal willingness to pay reported in table 4.8 does not give estimates of compensated surplus for the alternative improvement scenarios. One of the strengths of the CE method is that the estimated coefficients of the attributes enable to estimate the value of different scenarios from one application (Bennet and Blamey 2001). That is, from one set of the choice data, the values of different alternative scenarios can be estimated.

In theory, economic welfare measures are (1) the amount of money (given or taken away) that make a person as well off as they would be before a change, or (2) the amount of money (given or taken away) that make a person as well off as they would be after a change. Depending on how the choice experiment application is designed, it is also possible to use the results to derive estimates of the compensating surplus (CS) or the equivalent surplus (ES) that results from a change in resource use. The former measures the change in income that would make an individual indifferent between the initial (lower quality) and subsequent situations (higher quality) assuming the individual has the right to initial utility level. This change in income reflects the individual's willingness to pay (WTP) to obtain an improvement in recreational quality. On the other hand, ES assumes an individual has implied rights to the subsequent utility level. Hence, it represents individuals' WTP to avoid degradation in environmental quality (Freeman 1993).

Using the results from the regression, the CS can be estimated by employing the following equation (Adamowicz *et al*. 1998).

$$CS = -\frac{1}{\beta_M}\{\ln(\Sigma expV_0) - \ln(\Sigma expV_1)\}$$ ---------- (21)

Where β_M is the coefficient of the monetary attribute and is assumed to be the marginal utility of income. Equation 21 above allows for the valuation of multiple sites. This study considers only one site. Therefore, following Adamowicz and Boxall (1998) equation 20 was reduced to:

$$CS = \left\{-\frac{1}{|\beta_M|}\right\}(V_0 - V_1)$$ ---------- (22)

Where, V_0 and V_1 represent the initial and subsequent utility states, respectively (see equation 16). The model also enables the estimation of welfare changes (compensating surplus) associated with an array of changes in recreational quality of the site away from the "status quo" scenario (current situation).

In order to compute the visitors' CS for improvement in the Park's alternative management scenarios over the status quo option; Hence, three possible options were formed as follow.

Status quo levels (Current situation)

- No increment of forest
- existing level of wildlife population and
- Very limited services provision, scouts and, harsh and difficult roads to and within the park.

Scenario 1 (low impact improvement scenario)

- 50 percent increase in the number of wild life population
- 1 million new trees to be planted
- Provision of after visiting the park services

Scenario 2 (Medium impact improvement scenario)

- 100 percent increase in the number of wild life population
- 2 million new trees to be planted
- Provision of on-site and after visiting the park services

Scenario 3 (High impact improvement scenario)

- 150 percent increase in the number of wild life population
- 3 million new trees to be planted
- Provision of to reach the site, on-site and after visiting the park services

	Wildlife population	Afforestation	Additional Service
Status quo	0	0	0
Scenario 1	1	1000000	1
Scenario 2	2	2000000	2
Scenario 3	3	3000000	3

Table 4.9 Compensating surplus for visitors

Alternative improvement Scenarios	Mean WTP per visit in ETB
Scenario 1	226.21
Scenario 2	315.27
Scenario 3	404.32

Source: Computed from the survey data

Estimates of compensating surplus (CS) were calculated using equation 22; to use this equation to estimate the compensating surplus it is first necessary to calculate the utility associated with the current option and the option being considered. Using the RPL model, this is achieved by substituting the model coefficients and the attribute levels for the current option. The value of the utility of the alternative option is estimated in a similar way, except that the coefficient for the alternative specific constant for plan 1 and plan 2 is included and the attribute levels associated with the changed scenario are used. The compensating surplus for the change from the status quo to the new scenario is then estimated by calculating the difference between the two values, and multiplying this by the negative inverse of the coefficient for the gate fee attribute. Estimates of willingness to pay for the three scenarios are presented in table 4.9.

These are the marginal estimates, showing willingness to pay for a change from the current situation. It can be seen from the estimates that, the CS for the change from the status quo to the scenarios considered increases as we move towards improved recreational conditions of the site. Based on the RPL model which has a better fit, mean WTP for scenario 1 is ETB 226 per visit, whereas greater improvements in recreational services of the site under the medium impact improvement scenario increases WTP to ETB 315 per visit, and under the high impact

improvement to as high as ETB 404 per visit. The benefit derived from various improvement scenarios can be compared to the cost of these improvement projects so that a benefit-cost analysis can be made. However, this is beyond the scope of this paper.

Despite geographical, visitors and time frame differences, it is possible to compare calculated compensated surplus that conducted in Ethiopia with Awash National park. In this regard Ali (2011) attempted to estimate compensating surplus of semen mountain national park using choice experiment method. In his finding, the estimated compensating surplus from the status quo to potential scenarios show that visitors are willing to pay 251.6, in average, for high impact improvement scenario; while they are ready to pay 198.3 and 144.7 for medium impact and low impact improvement scenario, respectively. As compared to findings of Ali's study, the estimated compensating surplus of Awash Park is higher, for each respective scenario, than that of semen mountain national park. This may be because, site characteristics in these sites to some extent differing to one another.

CHAPTER FIVE

CONCLUSION AND RECOMMENDATIONS

1.18 Conclusion

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 such site is therefore deteriorating due to lack of proper management. Poor 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 Awash National Park represents one of the most outstanding nature. Because of its rich biodiversity, its high number of endemic species and its paramount biophysical features the park is being a recreational resource for everyone who visits this park. Despite its ecological, social and economic importance, the park is not under proper management. Besides, the precious wild mammal species diversity of the park is declining at an alarming rate. Continued land use/land cover changes coupled with increasing demand for resources have heavily affected the fauna and flora of the park.

To this effect, measures should be done in leadership commitment to understanding the current economic value of the park. This is because estimating the actual economic value of the Park will enable to preserve the site and generate maximum possible income from the site. In doing so, the study applied two standard procedures in environmental economics, i.e. Travel Cost and Choice Experiment Methods, using primary data collected from a survey of 195 onsite visitors.

The Travel Cost Method of valuation depends on information about the amount of money and time visitors spend getting to the site to infer a value for the site. Once the demand function was derived, it was used to estimate the benefit associated with the site. Because the sample was

collected only from current users of the site, the demand function was estimated using Maximum Likelihood estimates of the truncated model.

The regression results of the travel cost method showed that travel costs, cost of accessing a substitute site, age, income, education, family size and acquaintance with the site are important determinants of the recreation demand of the site. The recreational benefit computed from the regression analysis showed that the annual per person on-site recreational benefit of the site amounted to ETB 498.65. This amount was translated in to an expected aggregate annual benefit of ETB 4,987,965.14.

According to this study, the site management was able to capture only about 12.14% of the true economic recreational benefit of the site comparing it with the average annual income of the last six consecutive financial period (2011/12-2016/17). 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.

The Choice Experiment Method, on the other hand, was employed to measure visitor's valuation of the site's quality improvements and to examine the general attitudes towards the recreation site's resource, in particular to analyze how visitors value different recreational attributes associated with the site. The researcher employed three different attributes (wildlife conservation, Afforestation and service quality) as indicators of the recreation site's quality. In addition, a monetary attribute-gate fee was included in the choice experiment.

Multinomial and random parameter logit models were used for estimation. The analysis showed that the wildlife conservation attribute proved to be generating a higher impact on the utility for the visitors than did the additional service and forest attributes. This was also reflected in a higher willingness to pay for recreational quality attribute improvement. From the extended MNL model all the attributes were also significant and they have the expected sign.

From Choice experiment, the analysis showed that quality of the park deteriorating mainly due to forest and landscape degradation of the area, decline in the number of the wildlife population, lack of protected tourist zone, and lack of appropriate resting facility in the park.

Visitors are willing to pay to support the plan for the park improvement either through different attributes which is given consecutively as the increase in the number wildlife, afforestation, and improvement in the different services as the visitors showed in their marginal willingness to pay or alternative hypothetical scenarios in their welfare measures.

Finally, the methodological implication of this study in the context of environmental valuation is that travel cost and choice experiment valuation study can be successfully applied to generate useful economic information about recreation sites in developing countries like Ethiopia with effective field data collection.

1.19 Policy Recommendations

The results of the survey showed that visitors of ANP are willing to pay for improvements in the quality of the site as depicted by the three attributes of the site. This result has interesting implication in that if the site authorities change the current level of gate fee and raise additional money, there would be a higher income to support improvement and expansion of the types and varieties of recreational services. In other words, this gate fee having smaller proportion of the travel cost, if it is changed encourages the authorities to improve the quality of the site and hence visitors will be interested in visiting the site. Therefore, if this can be done, we expect the recreational benefit of the site to be higher than reported.

The results of the study also showed that there is large personal benefit that visitors derive from recreation which implies that there is potential demand for quality recreation sites. Therefore, it would seem reasonable to locate similar sites in some areas of the country. To this end, the government should issue licenses to private investors to develop such sites, or encourage and support local communities to develop and operate their sites for recreation. In doing so, the government could generate an excellent opportunity of income and employment to local communities and private investors.

The average consumer surplus per person that is estimated in this study could be used as a guide on the fee structure. Concerned authority should give due attention and design appropriate management plans consecutively for the increase in the number wildlife population,

afforestation, and improvement in the different services or improvement in the alternative hypothetical scenarios after they do the cost-benefit analysis and depending of their capacity. All these increase the recreational demand and quality of the park.

In many cases, decision makers have no idea as to the economic values of environmental resources such as a recreational site. They base their decision on their value judgment. Therefore, they should make their decisions based on estimates obtained through valuation techniques such as travel cost, choice experiment and other estimation methods.

Finally, this study has provided an estimate of Awash National Park taking both local and international visitors in to account, in a particular time period. Future studies could benefit from estimating the potential calculated value of the park for local and international visitors separately which can be very helpful in informing park quality conservation decisions.

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Appendix 1: Questionnaire

St. Mary's University
Department Of Economics
A Travel Cost and Choice Experiment Survey Questionnaire to
Estimate the Economic Value of Awash National Park

Date _____/_____/ 2017 G.C.

Questionnaire number_____

Thank you in advance for giving me your precious time. This is purely an academic research and has nothing to do with governmental or non- governmental organization. Your name will not be related to your answers and all your answers will be treated in strict confidence. This survey is aimed at obtaining information from Awash National Park visitors and you are selected randomly. Please note that all the information that you provide us is the main body of thesis work for the partial fulfillment of M.A. Degree in Development Economics at St. Mary's University. Your genuine answer is essential for the accuracy of the study and there are no right or wrong answers. **Thank you for taking part in the survey.**

II. Demographic Characteristics

1 Respondents personal information

1.1 Sex of the respondent

1.1.1 Male_____

1.1.2 Female_____

1.2 Age_____ (years)

1.3 Marital Status (please select one):

1.3.1 Single _____

1.3.2 Married _____

1.3.3 Divorced/separated _____

1.3.4 Other (please Specify) _____

1.4 What is the total family size (No. of family members) of the visitor? _____

1.5 What is your highest years of formal education study (in years completed) _____

1.6 Occupation:

1.6.1 Public sector employee_____

1.6.2 Private sector employee _____

1.6.3 Own business_____

1.6.4 Student _____

1.6.5 NGO _____

1.6.6 Unemployed _____

1.6.7 International organization _____

1.6.8 Other (please specify)_____

1.7 What is your disposable income in amount?

1.7.1 Employee _____ Br/Pound/Euro Per(Day, Week, Month, Year)

1.7.2 Own business_____ Br/Pound/Euro Per(Day, Week, Month, Year)

1.7.3 Other (please specify)_____ Br/Pound/Euro Per(Day, Week, Month, Year)

1.8 Nationality:

1.8.1 Ethiopian National _____

1.8.2 Foreign National _____ (please specify)

III. Travel cost Method Scenarios

2 Respondents travel and onsite information

2.1 Where do you live? Name of Place_____ Name of Region_____

2.2 How long did you spend on your trip from your home to Awash National Park? In hour _____ or day/s_____

2.3 Is that your first time to visit Awash National Park?

2.3.1 Yes _____

2.3.2 No_____

2.4 When did you know about Awash National Park? _____ Days/ Weeks/Months/ Years ago.

2.5 How many times have you visited Awash National Park during the past 12 months including this trip for recreation purpose? _____

2.6 Do you know any other recreational site that you would like to visit instead of Awash National Park?

2.6.1 yes_____

2.6.2 No_____

2.6.3 If 'yes' which site would you choose? _____

2.6.4 If 'yes' how many costs would you incur to visit the alternative site? _____

2.7 Was Awash National Park your primary destination during this trip?

2.7.1 Yes _____

2.7.2 No_____

2.8 How long do you stay in visiting on this trip?

2.8.1 hour/s _____

2.8.2 day/s_____

2.9 What is your mode of transport into Awash National Park?

2.9.1 Own Vehicle_____

2.9.2 Public Transport _____

2.9.3 Rented_____

2.9.4 Others: (please specify) _____

2.10 How much did/do you incurred for transport in the above equations?

2.10.1 If own vehicle, please specify money expenditure on fuel per trip _____Br

2.10.2 If public transport, please specify money expenditure on tariff per round trip _____Br

2.10.3 If rented, please specify money expenditure for rent per trip _____Br

2.10.4 If other, please specify money expenditure you spent per trip _____Br

2.11 Did you come to Awash National Park alone or in Group?

2.11.1 Alone_____

2.11.2 In group_____, how many individuals are in it? _____

2.12 What percent of your total recreational experience can be attributed to each of the following? (Responses must add to 100%)

2.12.1 = Journey to and from the site _____%

2.12.2 = Recreation on the site _____ %

2.13 How do you rate Awash National Park (1-5)?

2.13.1 Extremely Bad _____
2.13.2 Very Bad _____
2.13.3 Bad _____
2.13.4 Average (Adequate) _____
2.13.5 Good_____
2.13.6 Very good _____

2.13.7 Excellent_____

3 What types of improvements would you like to see at this recreational site?

_____

_____

IV. Choice Experiment Scenarios

Dear respondents, here what required is your perception for various options given in the choice sets and you are asked to choose your best options. You are kindly requested to give attention for the attributes: afforestation, wildlife and addition of services and they are independent of each other. Please tick the box below the alternative of your best choice. In case you want to change your previous answer please do not make hesitation, and feel free to change your answer.

Assume as if Awash National park administrative office and Ethiopian wildlife conservation authority (EWCA), have a plan of improving and conserving the elements within the ecosystem of the park in a sustainable manner and provision of well-organized tourist facilities.

There are two improvement options (option 1 and 2) with their respective new proposed cost of financing in a form of entrance fee and status quo level option (option 3) with its current level of entrance fee provided below in a form of choice sets. Hence, you are kindly requested to provide your preferred option.

Choice set 1: Which plan would you choose for Awash National Park ecosystem area?

Attributes	**Plan 1**	**Plan 2**	**Plan 3 (status quo)**
Afforestation	Planting 2,000,000 new trees	Planting 2,000,000 new trees	No change
Wildlife	150% increase in their number	50% increase in their number	No change[1]
Additional services	Provision of on-site and after visiting the park service[3]	Provision of after visiting the park service[2]	No change
Entrance fee	50% increase	150% increase	No change
I prefer (please tick in the box)	☐	☐	☐

*[1] the representative wildlife are those including the critically endangered animal, Beisa oryx, Lesser kudu and other those assumed to have significant tourism effect and the conservation mechanism applied for them will have a positive spillover effect for the remaining wildlife in the Park. Name of birds that are near-threatened; Lappet-faced vulture, Imperial Eagle, **Lesser** Kestrel, Basra reed warbler, Yellow-throated seedeater, Lesser flamingo, Pallid Harrier, Sombre rock chat*

[2] which includes library/museum, construction of additional lodges, hotels and camping equipment like tents, cabin, sleeping bags, mattresses, cooking gears.

[3] which includes health and medical treatment, trained tour guides and guards, protected tourist zone, recreation benches, shops, showers, swimming pool, and traditional transportations and library/museum, construction of additional lodges, hotels and camping equipment respectively.

[4] which includes information desk, improved infrastructure and map, and health and medical treatment, trained tour guides and guards, protected tourist zone, recreation benches, shops, showers, swimming pool and traditional transportations, and library/museum, construction of roads to and within the park, additional lodges, hotels and camping equipment respectively.

Choice set 2: Which plan would you choose for Awash National Park ecosystem area?

Attributes	**Plan 1**	**Plan 2**	**Plan 3**
Afforestation	Planting 2,000,000 new trees	Planting 1,000, 000 new trees	No change
Wildlife	50% increase in their number	150% increase in their number	No change
Additional services	Provision of to reach the site, on-site and after visiting the park service[4]	Provision of to reach the site, on-site and after visiting the park service[4]	No change
Entrance fee	50% increase	100% increase	No change
I prefer (please tick in the box)	☐	☐	☐

Choice set 3: Which plan would you choose for Awash National Park ecosystem area?

Attributes	**Plan 1**	**Plan 2**	**Plan 3**
Afforestation	Planting 3,000,000 new trees	Planting 2,000, 000 new trees	No change
Wildlife	**50% increase in their number**	**150% increase in their number**	No change
Additional services	Provision of to reach the site, on-site and after visiting the park service[4]	Provision of after visiting the park service[2]	No change
Entrance fee	100% increase	100% increase	No change
I prefer (please tick in the box)	☐	☐	☐

Choice set 4: Which plan would you choose for Awash National Park ecosystem area?

Attributes	**Plan 1**	**Plan 2**	**Plan 3**
Afforestation	Planting 3,000,000 new trees	Planting 1,000, 000 new trees	No change
Wildlife	**100% increase in their number**	**100% increase in their number**	**No change**
Additional services	Provision of after visiting the park service[2]	Provision of to reach the site, on-site and after visiting the park service[4]	No change
Entrance fee	100% increase	50% increase	No change
I prefer (please tick in the box)	☐	☐	☐

Choice set 5: Which plan would you choose for Awash National Park ecosystem area?

Attributes	Plan 1	Plan 2	Plan 3
Afforestation	Planting 1,000,000 new trees	Planting 3,000, 000 new trees	No change
Wildlife	**100% increase in their number**	**100% increase in their number**	**No change**
Additional services	Provision of after visiting the park service[2]	Provision of on-site and after visiting the park service[3]	No change
Entrance fee	150% increase	50% increase	No change
I prefer (please tick in the box)	☐	☐	☐

V. Follow-up questions

Which one of the following statements best explain why you made choices given in the above options?

1. I chose the status quo option because of an objection to the amount of entrance fee.
2. I understood that afforestation attribute is important and that I gave priority to choose the highest level of this attribute
3. I chose the cheapest option whatever its level is.
4. I understood that wildlife population attribute is important and that I gave priority to choose the highest level of this attribute.
5. I understood that additional services attribute is important and that I gave priority to choose the highest level of this attribute.
6. I agree to pay in order to experience the warm glow of supporting a good cause

VI. Observation of Awash National Park

1. Rank problems related to Awash National Park in order of severity.

1.1. Forest and landscape degradation of the area. _____

1.2. Lack of protected tourist zone._____

1.3. Lack of appropriate resting facilities. _____

1.4. Difficulties of access roads to and within the Park._____

1.5. Lack of modern swimming pools and toilet facilities. _____

1.6. Lack of facilities like information provision, rented transportation means like mules, horses, bicycles and motorbikes, shops for materials and fast food. _____

1.7. Severely hot temperature. _____

THANK YOU

Appendix 2A: Total number of tourist flow to Awash National Park

Total number of tourist flow to Awash National Park

Gregorian Calendar	Ethiopian Calendar	Description	Domestic visitor	Foreign visitor	Total
2011/12	2004	Number of tourist flow	4,654	7,243	11,897
2012/13	2005	Number of tourist flow	4,230	7,418	11,648
2013/14	2006	Number of tourist flow	3,806	7,593	11,399
2014/15	2007	Number of tourist flow	3,407	7,489	10,896
2015/16	2008	Number of tourist flow	2,050	6,072	8,122
2016/17	2009	Number of tourist flow	2,726	3,329	6,055
Average			3,479	6,524	10,003

Source; EWCA, Addis Ababa

Appendix 2B: Total amount of money collected from tourists of Awash National Park

Total amount of money collected from tourists of Awash National Park

Gregorian Calendar	Ethiopian Calendar	Description	Domestic visitor	Foreign visitor	Total
2011/12	2004	Currency in ETB	59,292	606,888	666,180
2012/13	2005	Currency in ETB	61,871	633,279	695,150
2013/14	2006	Currency in ETB	64,449	659,671	724,120
2014/15	2007	Currency in ETB	60,430	632,210	692,640
2015/16	2008	Currency in ETB	37,400	508,640	546,040
2016/17	2009	Currency in ETB	39,800	267,870	307,670
Average			53,873.60	551,426.40	605,300.00

Source; EWCA, Addis Ababa