ADDIS ABABA UNIVERSITY

SCHOOL OF GRADUATE STUDIES

"VALUING THE ECONOMIC BENEFIT OF ECOTOURISM AREAS WITH TRAVEL COST AND CHOICE EXPERIMENT METHODS: *A CASE STUDY OF SEMEN MOUNTAIN NATIONAL PARK, ETHIOPIA"*

BY

ALI YIBRIE

A thesis submitted to the school of graduate studies of Addis Ababa University in partial fulfillment of the requirement for the degree of Masters of Science in Economics

(Resource and Environmental Economics)

JUNE 2011

ADDIS ABABA

Acknowledgement

My utmost gratitude goes to my thesis supervisor Dr. Alemu Mekonnen for his indispensable advice, comments and encouragement which guided me in all phases of the study. I can say I am so lucky being advised by him. THANK YOU Dr! His excellent quality as a person and best as academician has taught me a lot in the course of the real life, and I usually come lost with words to express his lovely approach which is completely different from measurable favor. I would like to extend my foremost gratitude to Environmental Economics Policy Forum for Ethiopia stationed at Ethiopian Development Research Institute (EEPFE/EDRI) and Addis Ababa University for their partial backing of my study. My thanks are also extended to African Economic Research Consortium (AERC) for partial funding of my study and training program at Nairobi. My special thanks must also go to Dr. Girma Tesfahun, who worked the experimental design of the choice experiment.

Finally, I would like to thank all the data enumerators, the different staff at Simen Mountain National Park and Ato Maru, who is a park coordinator, for his great help in facilitating the field work. My Special appreciation also goes to my wife **Multezem Akmel** for her wholehearted support to complete this thesis.

DEDICATION

This thesis is dedicated to my beloved wife, **Multezem Akmel.**

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LIST OF ACRONYMS

ASC	Alternative Specific Constant
CBE	Commercial Bank of Ethiopia
CE	Choice Experiment
CS	Consumer Surplus
CVM	Contingent Valuation Methods
DC	Dichotomous Choice
EWCO	Ethiopian Wildlife Conservation Organization
IIA	Independence of Irrelevant Alternatives
ITCM	Individual Travel Cost Method
IUCN	International Union for the Conservation of Nature
MASL	Meter above Sea Level
MNL	Multinomial Logit Model
MWTP	Marginal Willing to Pay
RPL	Random Parameter Logit
SMNP	Simen Mountain National Park
UNESCO	United Nations Educational, Scientific and Cultural Organization
WTAC	Willingness to Accept Compensation
WTP	Willingness to Pay
ZTCM	Zonal Travel Cost Method

ABSTRACT

Simen Mountain National Park is one of the most well-known nature based recreational sites due to it's an impressive landscape and endemic wild animals. It was established in 1969 and was inscribed in the list of World Heritage sites by UNESCO in 1978. But this park has been in the list of world Heritage in danger since 1996 due to heavy settlement by farmers, declining numbers of Walia ibex, 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 out of the excess benefit 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, this 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 Birr 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 choice experiment. Multinomial and random parameter logit models were used for estimation and from this the marginal willingness to pay and welfare impact of the visitors was estimated.

The results of this study indicate that the recreational economic benefit of the park are much larger than what is currently collected by park authorities and thus the park authority can change the current prices of services. Moreover, alleviating the major problems that reduce the quality of the site and supporting improvement and expansion projects are promising for resource users and the management of the park as the visitors are willing to pay to support the plan for the park improvement.

Key Words: Simen Mountain National Park, Travel cost method, Choice experiment, Recreational Economic Benefit, Marginal willingness to pay, Welfare, Valuation

CHAPTER ONE

INTRODUCTION

1.1 Background

National parks like other environmental resources and public goods have a number of benefits in many different ways for humans. They have importance relating to the ecological functions. They can be used for recreational purpose and ecotourism sites which can enhance national income, and have economic impacts to society around the area of national park. Then, they can contribute to national economic growth (Nuva et al., 2009).

Now a day, the use of national parks for recreational purposes in many countries is increasing. National parks have both an opportunity and challenge when we use for ecotourism. The opportunity is to generate money by offering the attractive view of national park resources for the visitors of ecotourism that will provide visitors' satisfaction. The challenge is to keep the harmonizing component of the national park, such as to conserve the scenery and the natural resources, the historic objects and the wildlife therein. The situation becomes complicated under conditions of high visitation to the national park. Thus a strategy in managing the national park would combine both the opportunity and challenge by getting revenues from use of the resources by charging entrance or user fees (Nuva et al., 2009).

Usually benefits of goods and services are measured by what people are willing to pay for them in a market. The benefits associated with environmental resources are not effectively covered by established market mechanisms commonly used to reflect value. Since environmental goods (e.g. protected areas, wildlife, etc.) are not sold in a market and there is no market price for them, we

have to estimate what users would pay. Therefore managers of the environmental resources need information that provides money metrics of them to make effective, efficient, and equity planning and policy decisions. This is much more important in a world of limited financial resources and environmental valuation, in combination with strong demand pressures for the overexploitation and destruction of natural assets (Mendes and Proença, 2005). As a consequence, over the last few decades researchers have been attempting to develop the means whereby the benefits produced by protected areas can be measured and compared with the benefits of alternative uses of these areas and their resources.

The methods of valuation of non-marketed goods have 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. Here the problem is how to elicit people's WTP so as to estimate their value. Valuation techniques used to estimate the value consumers place on environmental and other public goods can be classified into two broad categories: revealed preference methods and stated preference methods. The first branch, revealed preference methods, infers the value of a non-market good by studying actual (revealed) behavior on a closely related market. The two most-well known revealed preference methods are the hedonic pricing method and the travel cost method (TCM). Stated preference methods assess the value of non-market goods by using individuals' stated behavior in a hypothetical setting and they include a number of different approaches such as conjoint analysis, contingent valuation method (CVM) and choice experiments (CM). But in this study only two of them, i.e. travel cost and choice experiment, are used.

1.2 Description of the Study Area

The Semen Mountain massif is an impressive landscape located in the North-western part of Ethiopia (about 846 km away from Addis Ababa and about 102 km from Gondar) where the highest peak in the country is found rising to 4533 meter above sea level (masl) with a breathtaking scenic beauty (Hurni, 1986). The history of SMNP is traced back to 1966 when there was no any protected area as a national park in the country, except *Menagesha* Suba forest, which is designated the oldest protected area starting from the fifteenth century. The Ethiopian government formally proclaimed the Semen Mountain National Park (SMNP) in 1969 and this was inscribed in the list of World Heritage sites by UNESCO in 1978, thereby ensuring its global significance as a natural heritage (Gete, 2010). Until 1996 the park was administered by the former Ethiopian Wildlife Conservation Organization. Later on, following the formation of Regional States, the SMNP was administered under the Agricultural Bureau of Amhara Regional State.

When SMNP was established, the total area was 136 km^2, but now the area expanded to 412 km^2, which lies in five districts, namely *Debarek, Adiarkay, Janamora, Beyenda* and *Tselemetkm*. It lies also within the center of a triangle of important historical sites of the country which are regularly visited by a number of foreign and local tourists namely: Axum, Gondar and Lalibela. The primary objectives of SMNP were to conserve the endemic species of Walia Ibex and places with endemic species of animals and plants with a wide range of composition and habitants, and an area of spectacular landscape and scenic beauty which is an ideal place for environmental conservation, education, scientific research and eco-tourisms (Gete, 2000).

The Semen Mountain is home for unique and diverse biodiversity (both flora and fauna) where many of them are endemic to Ethiopia. Though the park is home for 32 mammals and 182 bird species, Semen is known more by the richness (high rate) of endemicity than species diversity, as there are 11 endemic mammals and 6 endemic bird species, each accounting for 32.2% and 37.5% of the country's endemic mammals and bird species, respectively (Abebe, 2000). Semen is one of the parks that make the country 'center of endemicity' in East Africa, next to Madagascar. The 4 endemic large mammals of the park, which account for 57% of the country's endemic large mammals, are: *Walia Ibex* with a population of 623 as of 2005 (endemic to Semen only), Ethiopian wolf (Semen fox) with a population of 78 as of 2005, *Gelada Baboon* being more than 4000 in number, but *Minilik Bush buck* still not yet know its number. Besides, the park is also home for other large mammal species, such as: *leopard, caracal, wildcat, common jackal, hyena, klipspringer, bush dicker, black and white Coloobus monkey, Anubis and Hamedryads baboons.* In addition to large and small mammals, there are also 6 endemic bird species in the SMNP, namely, *Spot breasted plover, Abyssinian long claw, Abyssinian cat bird, Black headed siskin, Abyssinian woodpecker and Ankober Serine*. There are also 25 species of raptors including *lammergeier Gypaetus barbatus*, four other vultures and four species of eagle (Hillman, 1993). Thus, tourists will have ample opportunities to learn more about the primates by looking at socio-ecological aspects of the endemic Gelada Baboon (Theropithecus gelada) bleeding heart baboon or lion monkey as it is sometimes called. Maternal care, hierarchy among males, fighting for takeover and dominance among them, and other behaviors are the most impressive behaviors of this animal. Moreover, considerable numbers of species of rodents are also conspicuous in different habitats of the park.

The Semen Mountains also boast in a unique flora. Due to variation in altitude and topographical features, the vegetation in Semen Mountain is characterized by four different altitudinal belts; namely: Afro alpine moorland (3700-4400 masl), Ericaceous moorland/sub alpine highland (2900- 3700 masl), Montane forest belts (2000-3000 masl), and Savanna belt (below 2000 masl). The endemic and dominant plant species includes: *Erica arborea, Giant St. John's Wort (Hypericum revolutum), Giant lobelia, Abyssinia wild rose, Giant sphere Thistle, Rosularia simensis, dianthus longiglumi etc*. The numerous flowers in the upland and forested areas of the Semen Mountains National Park are of photographers delight (SMNP Report, nd).

Semen Mountain has also favorable climatic and agro-ecological conditions that enabled agricultural development to flourish since about 2000 years ago. The farming system is basically conditioned by the geological formation: there is predominantly mixed farming with crop and livestock subsystems linked with each other. Shifting cultivation is a common phenomenon both in the highland and lowland villages (Hurni and Ludi, 2000). Furthermore, Semen Mountains are not only sources of biodiversity and livelihoods but they are important water catchments too from which many rivers emerge and join Tekeze River. After they join Tekeze they are used to generate hydropower (recently) at the foot of Semen Mountain and extensive irrigation both in Sudan and Egypt (Gete, 2010).

1.3 Statement of the Problem

The Semen Mountains National Park (SMNP) represents one of the most outstanding natural areas and is a paramount specimen of world's natural heritage. Because of its rich biodiversity, its high number of endemic species and its paramount bio-physical features, the SMNP is being a

recreational resource to everyone who visits this park, has economic impacts to society around the area of national park, used as ecotourism site which can enhance national income and has international significance. It has been declared, as one of the first sites all over the world, a "World Heritage Site" by the UNESCO World Heritage Committee in 1978.

However, 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 if not almost non-existent. That is, even if recreational resources have been thought in brining positive utility for humans, there is 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 (Clawson et al., 1996). If more of the above resources are devoted to recreation or diverted or reallocated to different recreational uses, something must necessarily be given up from alterative uses. Therefore, quantitative estimates of both the costs and benefits should be properly conducted so as to allocate the existing scarce resources properly and efficiently. In this respect, the problem in recreational areas is that, we cannot rely on market values to estimate total benefits, for these commodities are club or public goods and are not produced and distributed in accordance with the market mechanism. Hence, we need to impute values that reflect the true social costs and benefits of activities using some indirect methods. Failure to incorporate the true social costs and benefits may underestimate net conservation benefits and overestimate net development benefits which in turn might impose an irreversible damage to recreational resources in favor of other development activities. This is due to the discrepancy between the level of national park service enjoyed by people and the low

value/attention attributed to them which results from ecotourism services are not traded in the market and their economic values are not actually known.

Furthermore, despite the fact that the park has many sources of attraction, 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 wide spread deforestation resulting from road construction, residents of people, grass burning, agriculture, firewood collecting, hunting and domestic livestock grazing. Accordingly 24% of the Park remained under cultivation (Hürni, 1980) and the population and its livestock within the Park are expanding by 2% per year (Beltran, 2000). And also several animals become locally extinct such as Walia ibex, leopard and Ethiopian (Semen) wolf, and larger ungulates of the lower Afro-montane areas. Observations of the Semen wolf have become increasingly rare since much of the habitat of its chief prey, the mole rat, has come under cultivation. The Walia ibex population has also dispersed and its range and presence within the Park has decreased; large areas of former habitat have been abandoned, and sightings have been made only in the most remote and inaccessible areas (Hürni & Stiefel, 2003). Moreover, during the years of civil unrest the Park's buildings and equipment were destroyed (EWCO, 1991). All of these problems made the park to be inscribed on the list of world Heritage in danger since 1996 and continually to reduce recreational qualities of the site. Thus, visitors might be forced to spend their recreation time on other substitute sites and the site be used for some other alternative development activities, which in turn may result in irreversible damage to the different environmental resources on the site. This is due to the face 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. In addition, even if a number of studies have been conducted to

estimate the benefit on the recreational areas in developing countries like Ethiopia, no one tried to determine the value of national parks for recreational purpose by combining travel cost and multi-attribute-based valuation methods except by Mesfin (2010) who has done on wetland ecosystem on Wondo Genet, Ethiopia. Thus, in this regard this study which is conducted to estimate the Semen Park benefits and the value that the people attach to multiple services of the park by using TCM and CE methods has paramount advantage and will contribute to the literature by tackling these critical problems. In particular this paper enables to demonstrate the Simen Park manager how can extract revenue out of the excess benefit to improve the qualities of the national park and expand the types and variety of the services.

1.4 Objectives of the Study

The main objective of this study is to estimate the annual recreational economic benefit of the park and determine the preferences for different attributes that visitors attach for the park using Travel cost and choice experiment methods respectively.

The specific objectives include:

- To identify factors that determines recreational economic benefit of the park.
- Estimating the visitors' marginal willingness to pay for different attributes of the Park and welfare impacts of improvements of the hypothetical scenarios of the park relative to the status quo.
- Identifying the socioeconomic factors that affect the utility of individuals for the improvements of the park's attributes.

- Based on the results, the researcher try to identify key challenges and provide alternative policy options which enable to improve the quality of the ecotourism/park for future generations and visitors, and also to draw concluding remarks.

1.5 Significance of the Study

Estimating the economic benefits of environmental resources has made significant headway in the past few decades. A lot of research work has been done in many developed countries since the first attempt has been made by Clawson and Knetsch in 1966. But in developing countries, even if national park and other recreational areas are playing an important role in tourism industries and economic growth, limited attempts have been made to estimate their economic values. So far, to our knowledge, no attempt has been made in Ethiopia to impute economic values for any of the national parks with a combination of travel cost method and choice modeling as environmental valuation techniques. Therefore, this is the first rigorous attempt to estimate total economic benefits of national parks in Ethiopia in general and Semen National Park in particular. Thus, this research work will contribute to the existing limited economic literature for Ethiopia in this area of environmental economics and also enables to provide quantitative results in a way that may facilitate the concerned body for better planning and management of the park. Moreover, the result may be used as an input for comprehensive and rigorous policy oriented research work in the area.

1.6 Scope and Limitations of the Study

Due to limited time and financial constraints, this study has restricted itself to the application of travel cost and choice experiment to estimate the economic value and benefits of improved park

quality of Semen Mountain National Park as a case study for only one year from users of the national park. Also samples are drawn only from current 140 foreign and 60 local visitors of the site. Furthermore, the study selected only four attributes, namely, afforestation to cover the degraded areas, increasing the number of endemic endangered wild animals (Walia Ibex and Ethiopian Wolf in particular), and additional services and one monetary attribute- entrance fee- by assuming that other attributes of the site that affect recreational quality of the site are held constant. However, it is believed that the techniques employed in this study could be easily adopted for any further comprehensive policy oriented research work to measure total economic benefits of other national parks or other environmental resources from larger samples drawn both from users and non-users and also can be used to compute the cost-benefit analysis of the Semen park if more resources are available to do the work.

1.7 Organization of the Study

The remaining part of this thesis is organized as follows. Chapter two presents theoretical background on environmental valuation and the literatures on various methods of valuation techniques followed by a review of previous studies particularly empirical literatures related to the method of travel cost and choice experiment method. In chapter three, the methodological framework of the travel cost and choice experiment, the development of the choice experiment survey, data collection, and survey design issues are presented in detail. The empirical results with descriptive statistics of the travel cost and econometrics results of the choice experiment are presented and analyzed in the fourth chapter. Lastly, in chapter five, the main findings of the study are summarized and some policy implications are discussed.

CHAPTER TWO

LITERATURE REVIEW

This chapter is concerned with the theoretical and empirical literatures with particular emphasis on environmental benefit estimation for national parks. The theoretical part will give a detailed description of what economic valuation can be used for, total economic value and the values that are included in it and also describe the theoretical framework for environmental valuation techniques that are used in this study. The empirical part presents a review of some of the empirical works done by other researchers on the subject area.

2.1 Theoretical Background

2.1.1 The Need for Environmental Valuation

A main motivation for environmental valuation is to include environmental impacts into cost-benefit analysis and another objective of valuation is to allocate the environmental resources efficiently on the various competing uses in a way that brings the highest possible benefit to the society once monetary value of the non-priced goods are known (for details see, for example, Perman et al., 1999). .

Environmental valuation could also be used for decisions regarding environmental regulation. Even though economic valuation may be used in cost benefit analysis, or some other tool for decision making, it does not guarantee any improvement or that correct decisions will arise from it, but according to Randall (1994) it will make the environmental values included easier to handle.

In this study only the economic benefit was estimated. No cost benefit analysis of the national park was made and therefore there is no decision made with regard to cost benefit analysis or policy decision regarding the Semen Mountain National Park.

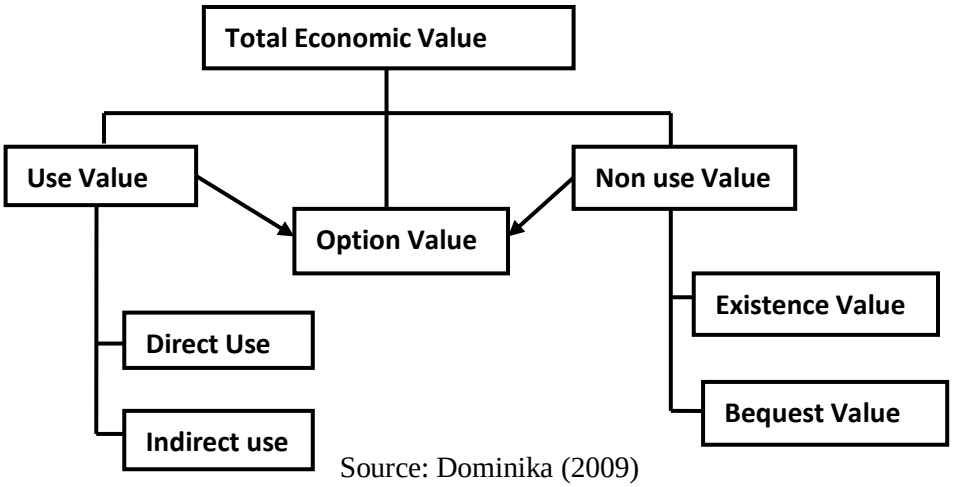
2.1.2 Economic Approach to Environmental Valuation

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 for environmental goods and services, they were considered as they have zero (low) values (Kolstad, 2000).

The economic concept of value generally places only instrumental value on environmental goods and is based on individual preferences following an anthropocentric or utilitarian approach. Human beings attach both use and nonuse value to many environmental resources including recreation sites.

Total economic value = Use value + Non use value

Figure 2.1 Total economic value of an environmental resource



Source: Dominika (2009)

Use values: These are the value that an individual or the society places on environmental good for direct or indirect benefits that they derive from using them. For this reason they are classified as direct and indirect use value. The former refers to the value that given for the benefit obtained from using the resources directly either through physical extraction or with no extraction. Examples of use value include the use of water for transportation, drinking and recreational activities such as swimming and others. This component of value results in the decline in the quantity or the quality of the resource available (Freeman, 1993). On the other hand, indirect use values are the value attached for the indirect benefit derived from the environmental goods and services. For example, use of lakes, oceans, and rivers to assimilate waste, and provide habitat for wildlife; forests act as carbon sinks, prevent soil erosion and encourage soil production; wetlands offer flood control and trap nutrients

Non use values: Non use values (also called passive use value or intrinsic value) represent value an individual or society places on an environmental resource even if they never intended to use it directly. In other words, nonuse values capture those elements of value that are unrelated to a current, future, or potential use or consumption and also people may benefit from the knowledge that an ecosystem simply exists unfettered by human activity. Non use values consist of existence value, bequest value and option value. Existence value arises from the benefit an individual derives from knowing that a resource exists or will continue to exist, regardless of the fact that s/he has never seen or used the resource, or intends to see or use it in the future. For example, some people derive satisfaction from the fact that many endangered species are protected against extinction and many people are willing to pay for protection of these species. While bequest value, as the name suggests, is derived from the benefits that individuals obtain from knowing that a resource will be available for future generations. For example, many of us

are concerned with future damage from global warming and would be willing to pay to reduce them, despite the fact that the vast majority of the damages are expected to happen long after our generation is gone (Dominika, 2009).

The last type of value is option value which is relatively a little more complex. Option value may be defined as the amount of money an individual is willing to pay, at the current time, to ensure the future availability of the resource. It may be thought of as an insurance premium one may be willing to pay to ensure the supply of the environmental good later in time. For example, people may be willing to pay for preserving biodiversity or genetic materials to ensure the option of having these goods in the future. Some consider option value to be one of the use components, which suggests that it is value of assuring future direct or indirect use of the good. Others interpret it as a nonuse component, because option value is not related to any current use of the good. Some even argue that option value should be considered a separate value category in addition to the use and nonuse ones, thereby allowing it to capture both future use and nonuse benefits (Dominika 2009).

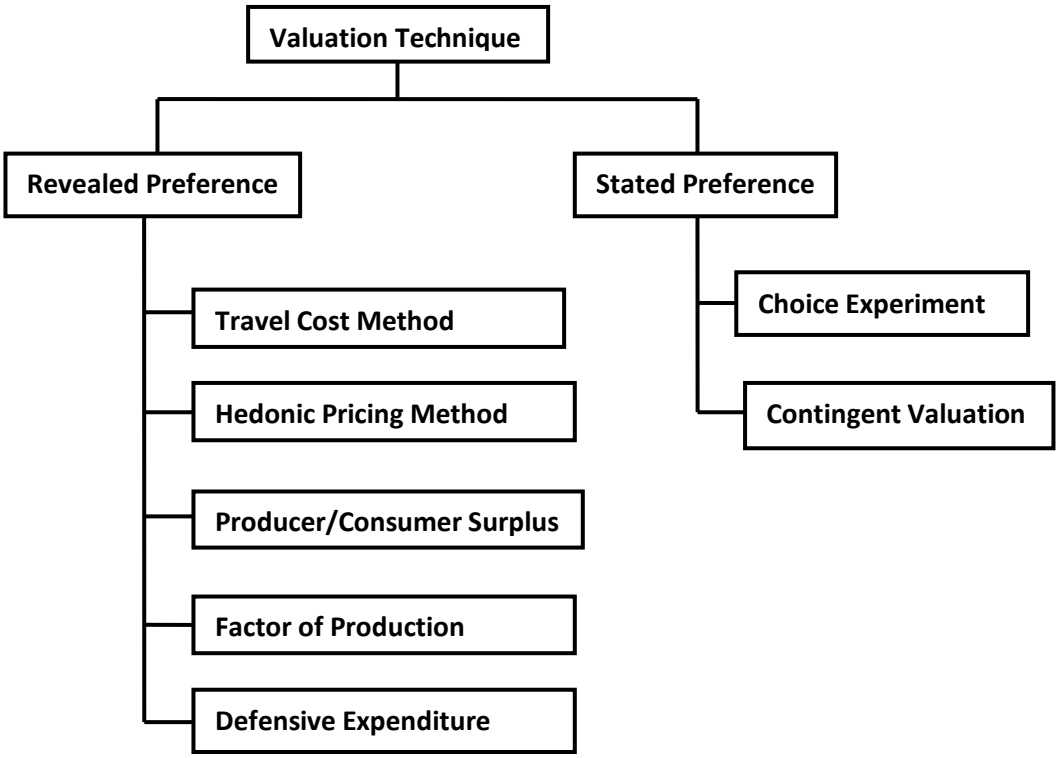
In the case of SMNP, the indirect use value could be the shelter that it gives to all life in the park, whereas the direct use value would be the recreation gained by visiting the park. Option value is associated with future benefits of the park while bequest value represents the future use of the park for future generations. Existence value could be the value that represents preserving biodiversity inside the park.

As a result, it is important that a proper measurement of total economic value of an environmental resource should take into account all these components of value. Any efforts to omit one or more of these components will underestimate conservation benefits of the resource under consideration.

2.1.3 Environmental Valuation Techniques

Environmental valuation is largely based on the assumption that individuals are willing to pay for environmental gains or willing to accept compensation for some environmental losses. The individual demonstrates preferences, which in turn place values on environmental resources and monetize the value placed on changes in environmental assets. Environmental economists have developed a number of market and non-market-based techniques to value the environment. Thus, in this section we attempt to provide a brief review of the theoretical basis and techniques of environmental valuation for the two basic approaches used in this study.

Figure 2.2 Environmental Valuation Methods



Source: Garrod and Willis (1999)

According to Garrod and Willis (1999), valuation methods can be broken up into those that rely on revealed preference and those that rely on stated preference. The stated preference (non-market based) methods are direct methods which attempt to elicit environmental values directly from respondents by asking them about their preferences for a given environmental good or service. Two of the most frequently used stated preference techniques are the contingent valuation and choice experiment methods. The revealed preference method is a market based indirect method as it values indirectly by observing individuals' behavior in actual or simulated markets. For example, the value of SMNP may be inferred by expenditures that recreationists incur to visit the park. The two most commonly used revealed preference techniques are the hedonic price method and the travel cost method.

2.1.4 The Travel Cost Method

The travel cost approach was originally proposed by Hoteling in a letter to the U.S. Department of the Interior's National Park Service. It was later redefined and applied by Clawson and Knetsch (1966). While it has been applied primarily to outdoor recreation in the United States and Canada, it is now a widely accepted and applied method of evaluating outdoor recreation benefits of natural resources such as water and forests.

The travel cost method seeks to place a value on recreational sites by using consumption behavior in related markets. It is a non-market procedure whereby a value for a recreation site is obtained by considering how much money people are prepared to spend to visit that site. Specifically, the costs of consuming the recreational amenity of a particular site are used as a proxy for price; these costs can include travel costs, entry fees, on-site expenditures and outlay on capital equipment. The method assumes *weak complementarities* between the recreational site and consumption expenditure. This implies that when consumption expenditure falls to zero, the extra utility of visitation is also zero, or alternately the recreational site will only be valued if consumption expenditure is positive (Hanley and Spash, 1993). The method has become widely accepted and is generally regarded as one of the success stories of non-market valuation, over the past 30 years or so (Smith, 1993).

The method establishes a relationship between the costs (price) incurred by travelers to a site and the number of trips taken. This relationship is further exploited to derive Marshallian consumer surplus for access to the site (for a recreation experience) by integrating the area under the recreation demand curve, between two levels of price (costs): the actual and the choke price (cost).

The empirical version of the TCM can be classified as the zonal and the individual versions based on the particular definition of the dependent variables. Conceptually they are the same with the major exception that in individual TCM the recreation demand and recreation cost relationship is based solely on individual observations. The individual version is highly preferred to the zonal for the following reasons (Mendes, 2002): i) statistical efficiency; ii) theoretical consistency in modeling individual behavior; iii) avoiding arbitrary zone definitions, and iv) increasing heterogeneity among populations within zones. On the other hand, zonal TCM is associated with a number of problems which includes the use of an average value of visitations as a dependent variable, problems associated with aggregation, omission of individual specific explanatory variables, and upward bias in the R^2 statistic arising from aggregating individual responses into zonal average figures. All these problems will produce biased estimates in ZTCM. On the other hand, ITCM has an advantage of allowing specification of a number of individual specific explanatory variables which gives it a stronger foundation than ZTCM.

TCM models appearing in the academic and empirical literature are variants on the general structure of the model above, the way the dependent variable is defined and measured, and the estimation strategy used (Ward and Beal 2000; Fletcher et al 1990). The most common practice is to estimate the recreation demand of the representative individual. Such a demand function is then used to calculate consumer surplus or recreational benefits associated with the site from using repeat visits to a site as a dependent variable. But in this study, due to the fact that individuals in the survey period visited the site only once, we estimate the recreational use value of the representative visitor of the SMNP for one trip per visitor, by using the individual TCM version to obtain the recreational economic benefit of the park.

Problems with the TCM

The main assumption of the TCM is that the value of a recreational site can be proxied by the costs that the recreationist incurs in undertaking the recreational experience. The method is based on real rather than hypothetical data and as such can provide true values which can be considered the strength of the approach. However, the assumption that the recreational value of a place is directly related to travel costs incurred in getting there could be an oversimplification of reality. For instance, people who live near the site may incur zero or minimal travel costs but may nevertheless have high values for the site. Some of the main limitations of the TCM are discussed below.

First is the treatment of multiple site visitors. One of the major assumptions of the travel cost methodology is that only one site is visited per trip (Haspel and Johnson, 1982). But when the site is remote but unique, some visitors would be from far distances and so the visit for them would be one of a group of activities and destinations. Thus they were unlikely to visit only one site. This results the problem to split the specific cost that incur only the site under consideration (Clough and Meister, 1991). If a trip has multiple objectives and the full cost of the trip is not a part-worth for the particular recreation site under consideration. Allocating the full costs would overestimate the visitation rate and the recreation value of the site (Kerr *et al.*, 1986).

Second is the treatment of time and other factors. Usually, the TCM would use the total amount of money spent to get to a site as an estimate of an individual's willingness to pay to visit the site. By only using the money spent on travel, other factors that could be seen as costs are not included. This would result in a bad estimate since individuals before making the trip also take

into account the time lost for the travel which instead could have been used for working and earning money. So to be able to obtain a good estimate of an individual's travel cost, a time cost that represents the opportunity cost of working has to be included. However, there is no consensus as to how time should be accounted for in TCM. Since there is no clear answer of how to solve the problem with how to value the time cost, two different approaches will be tested, one which builds on the respondents answers of how their travelling experiences was and another method which uses a certain proportion of the wage rate is multiplied by travel time to provide an estimate of the opportunity cost of time. However, the choice of the weight is quite arbitrary and open to question.

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. 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 net tax wage rate. Based on this finding, this study used one third of the net tax wage rate for valuing travel time.

Finally, there is the issue of treatment of overseas visitors. 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 recreation site by such foreign visitors in this study. But in this study I tried to incorporate overseas and multiple site visitors, which constitutes the important component of the total users of the park, in addition to domestic users to the study site.

2.1.5 Choice Experiment Method (CE)

CE is a recent innovation in stated preference techniques. The method finds its origins with Lancaster (1966) that proposed the idea that a 'good' can be treated as the combination of a group of characteristics. The first applications of CE were in the fields of marketing and transportation research. Since then, CE has been applied in several other disciplines including in environmental and health economics (see for example Louviere and Hensher, 1982; Louviere and Woodworth, 1983).

The CE technique is based on two fundamental building blocks of the characteristics theory of value (Lancaster 1966), and random utility theory (Thurstone 1927; Manski 1977). Lancaster's theory of derived utility assumes that consumers' utilities are defined over a bundle of attributes or characteristics of a purchased good or service (Gravelle and Rees, 1992). Thus a visit to a national park could imply the consumption of attributes such as fresh air, exercise, education, appreciation of nature, and observation of wildlife. A consumer will derive utility from these attributes as well as disutility from other attributes, such as congestion and physical exertion. Also, within a consumer choice framework, price can be considered to be another attribute. By requesting consumer preferences for distinct hypothetical packages featuring different levels of each attribute, including price, welfare measures and values can be estimated (Adamowicz et al., 1998).

In a CE application, respondents are presented with a series of choice sets, each of them containing usually three or more alternative plans. Then, respondents are asked to choose their preferred option from each choice set. The options in choice set are described using the attributes, which take on various levels. The combinations of attribute levels for each option in

each choice are established using experimental design techniques. Similar to a CVM, before the choice sets are presented to respondents, there is 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 conjoint analysis in the marketing and transport literatures. Recently, it has been developed and applied in environmental economics context by Adamowicz et al. (1994), Morrison et al. (1999) and others.

The CE method is believed to have several advantages. It is thought to encourage respondents to concentrate on the trade-offs between the characteristics of the good. Adamowicz et al. (1998) argue that the repeated nature of a CE choice task makes it difficult for respondents to behave strategically. Much like the CV approach, the CE method allows the valuation of a good under conditions that do not currently exist. Possible difficulties associated with CE include respondent annoyance (if the respondent dislikes all the possible alternatives), and the potential for respondents to ignore one of the attributes if it lacks credibility.

Specifically, the reasons for increased interest in using CE relative to CVM are:

- It is easier to estimate the value of the individual attributes that make up an environmental good and in doing so it also provides a large amount of information that can be used in determining the preferred design of the good.
- CE provides the opportunity to identify marginal values of attributes that may be difficult to identify using revealed preference data because of co-linearity or lack of variation.
- CE also avoids the "yea-saying" problem of dichotomous choice design in CVM, since respondents are not faced with the stark "all or nothing" choice in that design of CV. They may choose one of two environmental alternatives, or the status quo, in each choice

pair, of which they receive many. There are thus repeated opportunities for them to express their environmental preferences within a CE design.

- The repeated sampling approach of CE allows for internal consistency tests in choice alternatives in the sense that models can be fitted on sub-sets of the data.

On the other hand, the potential problems associated with CE relative to other stated preference methods are:

- Its rank/choice complexity in questioning process results greater strain on respondents' cognitive capacities as compared with a CV study.
- Difficulty of selection of appropriate attributes and levels.
- There is more technical complexity particularly in the experimental design of the data compared with CV studies.

2.2 Empirical Literature Review

2.2.1 Studies on Recreational Benefit using TCM and CVM

Mahamud (1998) conducted a research to attach quantitative estimates to the on-site recreational benefit of Sodere recreation 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 and contingent valuation methods, 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, 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. The 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.

He concluded that, the annual on-site recreational benefit of the site was estimated to be birr 9,824,094.80 (US $1,403,442.1) per year but the site authorities collect only 9 percent of this sum, i.e. an average of birr 856,680 (US $122,382) per year, from gate fees. This shows that much can be done to generate revenue for the support of quality improvement and expansion projects at the site. On the other hand, using the same models, the welfare effects of congestion

and malaria problems were valued as birr 1.37 (US $0.20) and birr 4.39 (US $0.63) per visit respectively, showing that the relative depth and seriousness of malaria problems on the site.

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. In TCM, since people indicated that they would not make repeat visits as it is exotic and isolated place, they tried to solve the problem by asking the respondents 'What is the maximum amount of money that you would have paid to take the trip?' and the choices were from the present cost to three times the present cost in increments of 0.5. This information was used to compute the consumer surplus of the site. The results 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.

Amer and Said (2006) used two non-market valuation techniques namely the travel cost and open-ended contingent valuation methods to examine the recreational pattern of Dibeen National Park in Jerash, Jordan and to estimate the use value that would be used to demonstrate the potential magnitude of this environmental amenity that cannot be ignored in policy making in Jordan. A survey of 300 individuals was used to elicit the recreational value of the park.

The TCM were analyzed using Standard Poisson regression model with number of visits to the site regressed against a number of explanatory variables such as travel costs, visitor's age, level

of education and satisfaction. The results indicate that the demand for recreation would be negatively correlated with age, level of education, travel costs and satisfaction. Using the TCM estimates, the average value of the recreation in Dibeen National Park is JD 71.55 (US$ 100) per person per recreation day and the annual recreational benefit is approximately JD 13.6 million (US$ 19.2 million). But this figure would vary from year to year depending on the number of visitors.

On the other hand, the CVM was used to estimate the willingness to pay for conserving and improving the services on the Dibeen National park by employing Tobit regression model with WTP responses as the dependent variable, and the respondent's satisfaction, education, age and income as explanatory variables. Of the 283 respondents, 74 respondents were not willing to pay for the quality improvement in the park. The results show that income and satisfaction have a positive and significant influence on WTP, while education and age have a negative and insignificant influence on WTP. Similarly, the mean willingness to pay for conserving and improving the services on the park from CVM was JD 5.53 (US$ 7.8).

Chutarat (2008) used the travel cost method (TCM) and the contingent valuation method (CVM) to estimate the economic value of Phu Kradueng National Park in Thailand and the demand for traveling and willingness to pay. The data for this study were collected by conducting two large scale surveys on users and non-users. A total of 1,016 users and 1,034 non-users were interviewed. The data were analyzed using multiple linear regression analysis, logistic regression model and consumer surplus (CS).

Using the travel cost method which provides an estimate of direct benefits to park users, the survey found that visitors' total willingness to pay per visit was 2,284.57 baht, of which 958.29 baht was travel cost, 1,129.82 bath was expenditure for accommodation, food, and services, and 166.66 bath was consumer surplus or the visitors 'net gain or satisfaction from the visit.

Using CVM, the mean maximum WTP was found to be 84.66 baht per trip for users and 38.15 baht for non users for improved services such as road improvement, increased cleanliness, and upgraded information. From this, the total users and non-users value of Phu Kradueng National Park was estimated to be 1,400.10 million baht per year, or an average of 122.61 baht per hectare per year.

Sergio and Sherry (2010) employed travel cost and contingent valuation methods to derive estimates of economic value for recreational use of Los Nevados National Park (LNNP) in the Andean region of Colombia. Park visitors were surveyed regarding their travel costs and willingness-to-pay (WTP) for ecological restoration of areas affected by wildfires in 2006. Data used for the analysis were obtained from personal interviews conducted at the LNNP during July 2007. A total of 64 Colombian visitors were interviewed.

The travel cost data was analyzed using a zonal travel cost model. Here respondents were asked to list their expenses for transportation, lodging, equipment rental, and guidance services and secondary visitation data is used with population data to estimate visitation rates by zone. All the parameter estimates for the travel cost variable have negative signs which adhere to economic theory, resulting in downward-sloping demand curves and statistically different from zero, indicating that as travel costs increase, fewer visits to LNNP are predicted. The total surplus economic value for trips to LNNP for the 13 states included and the seven-month period of

available data ranges between 2.2 billion Colombian Pesos (COP) (1.1 million USD) or about 83,754 COP per person, and 9.3 billion COP (4.6 million USD) or about 353,483 COP per person.

On the other hand, the contingent valuation experiment used a dichotomous choice (DC) format followed by an open-ended question asking for their maximum WTP for restoration. Here interview began by asking respondents how familiar, if at all, they were with the wildfires that occurred in 2006. Then, they were informed about the magnitude and location of the wildfires and were confronted by a scenario in which the park authorities are considering an increase in the park admission fee to cover restoration expenses. A card with the proposed fee increase (one of four values) was then shown to the respondent, followed by the question. The average WTP for restoration elicited through the closed-ended DC exercise was found to be 3,969 COP, or about 2 USD per person. The average WTP for restoration elicited through the open-ended exercise was found to be 6,742 COP or about 3.50 USD. If these average values are representative of the visitor population and visitation in 2007 remained at 2006 levels, park management authorities could have raised between 238 and 405 million COP, or between 119,000 and 202,000 USD for ecological restoration in 2007.

Loewen and Kulshreshtha (1995) employed the travel cost and contingent valuation method to estimate the recreational value of the Prince Albert National Park. This study is based on a sample of 79 Prince Albert National Park visitors residing in Saskatchewan and the analysis was conducted on the following types of visitors, namely, day visitors, accommodation guests (both commercial and noncommercial) and campers and their expenditure on average was given as $27, $44, $13 per person per day respectively. Campers tended to stay the longest and travel in

larger groups. Respondents showed close similarities in terms of education, family size and income. Several activities at the Park were correlated positively with income. These include fishing, hunting, ice fishing and cross-country skiing. In contrast, camping and picnicking had a negative relationship with income.

The consumer surplus estimated from the TCM and the CVM was $24.00 and $13.68 per person per day respectively. The annual value of the park can be estimated as approximately $16 million using TCM. This number would obviously vary from year to year depending on visitation. The consumer surplus was also estimated with the exclusion of a substitute variable in the TCM and resulted in an estimate of $29.74 per person per recreation day, about 24% higher than the estimate with a substitute variable.

2.2.2 Studies on Recreational Benefit using TCM

Melaku (2007) applied individual TCM to measure the recreational economic benefit using on-site survey data from Bishangari lodge in Oromya region in Ethiopia. His paper uses a truncated count data demand model to estimate the user's value of access to this wilderness area based on a sample of 175 individuals.

The regression results showed that distance, travel cost, number of days of stay at Bishangari, income, education, Weynee substitute site and group travel are important determinants of the recreation demand of the site. The coefficient of distance travel cost and the number of days stayed at the site presents negative and significant figure but the coefficient of income, group

visits, education, and visit to Weynee lodge brought positive and significant influence on the site visitation.

The recreational benefit computed from the regression analysis shows that the aggregate on-site recreational benefit per visit amounted to birr 820. The expected total annual benefit of the site was 3,943,500 birr. Records show that the enterprise is getting only about 25% of the true recreational benefit of the site. When compared to the net-economic benefits of the Bishangari lodge, the economic return the company collects is very low. This is particularly the case when the relative return to the ecotourism area is considered in terms of high accommodation costs and investment expenditures.

Sitotaw (2003) applied the individual TCM to value economic benefit of Wabi Shebelle Langano area in Ethiopia using truncated Poisson method. The recreation benefit of the site was estimated to be birr 8,685,777. However, the site authorities collected 20.87% of this sum, showing that the site is perhaps not used efficiently.

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

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

Navrud and Mungatana (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 was 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 Proença (2005) used on-site individual observation Travel Cost Model to estimate the recreational value of Peneda-Gerês Natural Park (PGNP). Count Data distributions and a version of hyperbolic discounting framework distribution were used to estimate a measure for 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 day visit would be 3874 € and each average five days length visit would be worth 17896 €. These are relatively large use values for the users of the PGNP. To have a more precise idea about the values involved in the year of the questionnaire, approximately 12000 visitors camped in PGNP generating a present recreation value per day of visit of 1488 000 € (12 000 ×124 euro) , and of

7116000 € (12000 × 593 euro) per average five days length visit. The empirical estimates of the average representative visitor's present equivalent surplus willingness to pay, based on the impact assumption of closure or loss of access to the park were 123 € per day per visit, and 593 € per each average five days length visit, per visitor. These values suggest that recreation use of nature has a higher value than certain economic activities in the area.

2.2.3 Studies on Recreational Benefit using CE and TCM

Mesfin (2010) applied CE and TCM to attach quantitative estimates of the recreational benefit of Wondo Genet recreational site (which is a wetland ecosystem area), so as to demonstrate how the respective authorities can extract revenue out of the excess benefits to improve qualities, expand the types and varieties of their services, which is one of the most known nature-based recreation sites in Ethiopia. He used primary data collected from a survey of 192 on-site visitors, and Multinomial and Random parameter logit models were used for estimation purpose. Because the sample was collected only from current users of the site, the demand function was estimated by using Maximum Likelihood estimates of the truncated model.

The Travel cost method, which used the amount of money and time people spend to reach the site, enabled him to derive the demand equation for the site which in turn was used to calculate recreational benefits associated with the site. The regression results of the TCM indicate that travel costs, income, education, and cost of accessing a substitute site and acquaintance with the site are important determinants of the recreational demand of the site. Using the Maximum Likelihood estimators of truncated models, the annual on-site recreational benefit of the site was estimated to be Birr 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. He used three recreational attributes (forest, recreational quality and general service) and one monetary attribute (gate fee). The estimation was conducted by using the Multinomial and Random parameter logit model. The results indicate that all the attributes were significant factors in affecting the probability of choosing an alternative scenario. But visitors were given high value for recreational quality attribute (such as the construction of additional swimming pool and toilet facilities) than forest and general services attribute. This was implied by their marginal willingness to pay for different attributes which was found to be Birr 7, Birr 2.93, and Birr 0.985 per visit for recreational quality, general services and plantation of degraded areas respectively. Moreover, compensating surplus estimates which reflect overall willingness to pay for a change from the status quo to alternative improvement scenarios were calculated and obtained as Birr 44, Birr 37 and Birr 22 per visit for high impact scenario, medium impact scenario and low impact scenario respectively.

2.2.4 Studies using CE

Girma (2006) conducted his study on valuing the benefit of improved lake quality by taking the case of Lake Awassa using choice experiment. The survey was administered to a random sample of 200 fishermen from two fishing cooperatives working on Lake Awassa. He analyzed the data using multinomial logit model by identifying two environmental attributes- Tilapia fish stock and surrounding forest cover and one monetary attribute- fishing permit. Two blocks of twelve choice sets were created and each respondent was presented with six choice sets.

The results showed that in the basic model all attributes were significant and have expected sign while in the extended model the forest attribute was obtained insignificant, and the explanatory power of the model improved with the inclusion of the socioeconomic variables. He also derived the implicit prices for each attributes and obtained that the local fishermen are willing to pay birr 8.8 per month for an improvement in the tilapia fish stock and 0.0000055 birr for each new plantation of trees. Compensating surplus estimates which reflect overall willingness to pay for a change from a status quo to alternative improvements scenarios were also calculated. The estimate for the high impact, medium impact and low impact scenario was respectively estimated to be 31.4, 28.6, and 18.6 birr per month.

Fetalew (2009) applied choice experiment for valuation of Lake Tana's fishery and watershed. He used primary data collected from a survey of 162 fishermen from members of association that came from different districts in two zones-west Gojam and south Gondar. Multinomial and random parameter logit models were used for estimation. He identified two environmental attributes- fishing control and lakeside plantation and one monetary attribute-payment for fishing permit in his study, and six choice sets were created and presented to be answered by each respondents.

Results showed that all the attributes included were significant factors in affecting the probability of choosing an alternative scenario. The marginal willingness to pay for the attributes implied that fishermen were more concerned about the fishing control which had higher value than lake side plantation. Accordingly, the marginal willingness to pay for fishing control was 15 birr per month and 50 cents per month for lake side plantation. He also included the household characteristics in the modeling and obtained monthly household income, years of education, and

family size were found to be significant. Moreover, he computed the economic welfare for two scenarios and the result suggest that fishermen are willing to pay 57 birr per month for a moderate scenario improvement and 93 birr per month for aggressive scenario improvement in those attributes.

Han et al. (2010) conducted a research using a choice experiment method to estimate the WTP for various management attributes associated with the Korean mountain goral, an endangered species. The study used primary data from a survey of visitors to Woraksan National Park, South Korea. Given the need to examine multiple attributes, a choice experiment approach was used to estimate WTP for expanding the goral population by reintroduction, establishment of a sanctuary, education of and information given to local residents, and preservation fund amount. The basis for the choice experiment approach is the random utility model. Three population levels of gorals (10, 50 and 200 animals) were included. Sanctuary attribute consisted of three levels: no establishment, establishment of core zone, and establishment of core plus buffer zones. Education and information attribute had three levels: education of 5%, 40% and 60% of the local residents. Four levels (1000, 10,000, 30,000 and 50,000 Won) were included for the preservation fund. Because it is unfeasible to develop a questionnaire design containing all choice sets, the number of choice sets was reduced using an orthogonal fractional factorial design. The resulting design consisted of 18 choice sets, which were divided into six sets of three choice sets. Each questionnaire contained one of the three choice sets.

Results from choice experiment for each attributes reveal that WTP for increasing the number of gorals from the current status of 10 animals to 50 animals was approximately US $13.06 per household, whereas WTP for an increase from 10 to 200 gorals was $18.06 per household. The

difference between these two WTP gives an estimate of the WTP for going from 50 to 200 animals of $5.00 per household. Although respondents placed a positive value on gorals, as the number of gorals increased the value of gorals decreased. Similarly, for establishment of a preservation zone, the WTP for a core zone was $20.35 per household whereas the WTP for a core zone plus buffer zone was $36.01 per household giving a WTP of $15.67 per household for the buffer zone. The core zone is a protected area for gorals, while the buffer zone, which lies between the core zone and the visitors' area, is not protected. In both core and buffer zones, however, visitors' activities are prohibited. Respondents appeared to place a higher value on the core zone than the buffer zone, indicating knowledge of the importance of the core zone. The last management attribute was education of and information for local residents living around the National Park. Respondents' WTP for increasing education from 5% to 40% of the residents was $7.32 per household, which was smaller than increasing education levels from 40% to 60% of the residents ($11.96). This may indicate that respondents recognize the value of educating the majority of the residents concerning the gorals and the effects of illegal poaching.

Robert and Zenia (2001) used choice experiments approach as a mechanism to analyze the preferences of national and international tourists in relation to the development of Barva Volcano Area in Costa Rica. The study was facilitated by the fact that there is an immediate need for information to help park managers properly develop the Barva Volcano site for greatly increased visitation rates due to a new road, which will greatly improve access. Furthermore, the implementation of the study was aided by the fact that a close substitute site, Poas Volcano, was a convenient location to conduct a survey, and that visitors to Poas can be considered to be informed consumers of the amenities in question. Choice sets were developed in collaboration with park managers. A survey was conducted of 171 Costa Rican and 271 foreign tourists who

visited Poas Volcano in 1999, a well-visited alternative site to Barva Volcano. Survey data was analyzed using conditional multinomial logit models with four attributes, namely, information, view, use restriction and entrance fee.

The results of the study reveal that the preferences for national and foreign tourists are similar in direction and mostly similar in magnitude. Both visitors preferred improved information, improved infrastructure, low entrance fees as well as aerial trams with observation towers and picnic areas. Foreign tourists demonstrated strong preferences for the inclusion of restrictions in the access to some trails, whereas Costa Ricans did not show any significant preference for restrictions. But it may be difficult for National Park managers to develop use restrictions that address the concerns of foreign tourists, who want to appreciate nature in relative isolation, and Costa Rican visitors who would like a natural setting for family recreation and picnics. However, it should be noted that Costa Rican families tend to visit during weekends, whereas foreign tourists can schedule their visits during the week and encounter less congestion. If necessary it may be acceptable for Park managers to limit access to certain trails during the week, to allow for some isolated nature appreciation, and to allow unlimited access during weekends when crowds require more space. Furthermore, marginal willingness-to-pay for greater information, best view and use restriction was estimated to be $1.54, $2.11, $3.31 for foreign tourists and $1.01, $2.00, $0.73 for Costa Rican visitors respectively. In general, the survey respondents demonstrated a preference for site development, with efforts to provide more information, better views, and more modern infrastructure. The study also concludes that choice experiments are a useful tool in the analyses of tourist preferences for the development of protected areas in developing countries.

Birol et al. (2005) used choice experiment to estimate the non-use values of wetlands. The case study was Cheimaditida wetland. Here Choice experiment was designed to value the wetland management scenarios and to investigate heterogeneity in their preferences. There are two environmental and two economic and social attributes selected to reflect non-use values generated by the wetland. The former are biodiversity and open water surface area, and the latter are the inherent research and educational values that can be extracted from the wetland, and the values associated with environmentally friendly employment opportunities. In addition, one monetary attribute was included to reflect the welfare changes.

The management levels assigned for biodiversity were low (deterioration from current levels) and high (a 10% increase in population and size of habitats). For open water space area attribute, the levels was given as low (Decrease from the current open water surface area of 20%) and high (Increase open water surface area to 60%). Similarly, research and educational extraction has the levels – low (deterioration from the current levels of extraction) and high (Improve the level of extraction by providing better facilities). For each of the remaining two attributes, four numerical levels were identified.

Results from this choice experiment reveal that there is considerable preference heterogeneity across the public and they attach positive and significant values for the sustainable management of the wetland. Specifically the conditional logit model results in all the attributes are positive and significant factors in the choice of wetland management scenario, and *ceteris paribus* any single attribute increases the probability that a management scenario is selected. When the payment attribute is used as the normalizing variable, the most important wetland management attribute is the management of biodiversity in the wetland. This is followed by open water

surface area and research and educational extraction, and the re-training of locals attribute (per person) in descending order of importance.

Adamowicz et al. (1998) present the first application of CE to estimating non-use (passive use) values. Again, both CE and CVM responses were collected. The study focused on the protection of old-growth forests in west central Alberta, from the perspective of safeguarding caribou populations (a threatened species in Alberta). The CVM question involved the restriction of recreational and commercial forestry activities to allow caribou to increase to a "minimum viable population", using higher taxes as the payment vehicle. The CE questionnaire contained alternative woodland designs described in terms of five attributes (caribou population, area of wilderness, recreational restrictions, forest industry employment and provincial income tax level). Each attribute took one of four levels: the status quo, one level below this, and two levels above it. Since attributes varied both above and below the status quo, both WTP and WTAC (willingness to accept compensation) could be estimated. Each respondent received eight choice sets, and respondents were chosen as a random sample of residents in Edmonton.

Results in the CE showed that all attributes except employment were significant with the expected signs. The linear model was outperformed by the quadratic model, since all the quadratic terms had high *t* -statistics. A test showed that the attribute parameters did not differ significantly between the CE and CVM models, when the scaling effect was allowed to be heterogeneous: this might be considered to be a test of convergent validity. Error variances were not significantly different between the two models. A quadratic model gave higher welfare measures than a linear model for improvements in caribou populations. Finally, the authors were able to demonstrate the existence of an endowment effect under WTAC scenarios (in other

words, a negative utility being associated with moving away from the status quo). This follows from the result that the alternative specific constant was negative and significant.

In general, 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, has, to my knowledge, failed to combine travel cost and multi-attribute based valuation (choice experiment) methods to value national parks. Furthermore, the existing research is mostly restricted to measuring the recreational net benefit of the number of trips as dependent variables, not for only one trip. 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 have not received much attention in the literature in general and in Ethiopia in particular.

CHAPTER THREE

Data and Methodology

The study basically employed two standard procedures in recreation economics (Travel cost and Choice Experiment methods) to estimate site benefit for the Semen Mountain National Park. The data and methodology used for this study are discussed in this chapter.

3.1 Data Sources

The data for this study was obtained from primary sources. It was collected from a sample of on-site visitors at Semen Mountain National Park by means of a questionnaire. The data sets include all the information necessary to represent all the variables to estimate the required models. Given time and financial constraints and bearing in mind the need to minimize exposure to small sample bias; this study was limited to 200 total samples of which 140 were from foreign visitors coming from different parts of the world and 60 from local visitors. A relatively large number of foreign visitors were included in this study because most of the park visitors are foreigners. The number of respondents was constrained by the project budget, interviewer work load, and difficulty in intercepting visitors before they departed from the park.

The survey was administered using face-to-face (in-person) interview. Three enumerators were employed and supervised by the researcher to interview the respondents. Two of them were students at university of Gondar and the third was at Debark. Before the main survey interviewers were trained carefully on how they approach the problem to the respondents, explain the whole scenario and the attributes and their levels to be used in the survey.

3.2 Method for Travel Cost

The application of a travel cost model involves a number of assumptions about factors such as the specification of the dependent variable, the measurement of travel costs, the specification and measurement of other independent variables, the specification of the functional form, and the appropriate integration procedure to calculate the estimates of consumer surplus (CS) (Haab and McConnell, 2002).

The common practice in TC method is to derive the recreational demand equation and then estimate consumer surplus that enables to calculate recreational benefits associated with the site from using repeat visits to a site as a dependent variable. But this may not always be the case. As is the case for this study, there are situations where (almost) all visitors may not make repeat visit to the site not because they did not benefit from it but because it is an exotic, isolated place that they were unlikely to visit more than once. To solve such problem and following Mladenov et al., (2007), we determine the consumer surplus based on responses of the respondent to the question: 'What is the maximum amount of money you would have paid to take the trip?' The choices were from the present cost to three times the present cost in increments of 0.5.

Accordingly, the Consumer Surplus of the SMNP can be defined as the difference between individual maximum willingness to pay and actual recreational expenditure he/she supports to use the park for visitation and recreation purposes. The advantage of this measure is that once the average CS of a representative visitor is estimated, it will be possible to obtain that total surplus value for the site per annum by multiplying the total number of visitors to the park in previous year with the average surplus value of per person (Morey 1994).

Consumer surplus computed from the travel cost portion of the data collected was calculated as:

$$CS_i = (CSMNP + TC) * MWTP - (CSMNP + TC) \quad \text{.....(1)}$$

Where **CS_i** is the consumer surplus per trip, **CSMNP** is the amount spent only during the Semen Mountain national park portion of the trip, **TC**[1] is the total travel cost associated with a round trip to and from the park, and travel time costs which is calculated by taking one third of net of tax wage rates, and **MWTP** is the maximum willingness to pay beyond their present cost to take the trip (ranging from 1 to 3, in increments of 0.5), all for the i^{th} individual.

Visitors were also asked questions about trip characteristics, such as trip cost, transport costs, other sites visited, type of accommodation and services included in their package, number of days stayed, staying cost and mode of travel into the SMNP. Socio-economic data were also collected to determine a profile of the type of tourists drawn to the SMNP including income, age, marital status, occupation, gender, education, size of household and nationality.

3.3 Econometric Model Specification for Choice Experiment

Choice experiment (CE) is a technique that provides respondents with multiple choice sets, in which each choice set usually contains two or more management options. The options in each choice set contain common attributes, which can be at various levels. The respondents are asked

[1] $TC_i = \frac{Air\ \ Cost + CTRAN}{Sites} + OP_{ti}$; $OP_{ti} = 1/3 * PDI * \frac{Days}{Sites}$; Where **OP_{ti}** is the opportunity costs in birr of travel time per visitor per trip, **PDI** is the per day disposable income, **Days** is the number of days spent in the round trip travel, **Air cost** and **CTRAN** represent the round trip transport cost from abroad and locally spent (either for package or public or/and air transport) respectively, **Sites** represents total number of sites visited in Ethiopia. Here the travel cost and days spent on travel is assumed to be equal across the visited sites. The cost for travel and on-site cost per day is assumed to be equal from a single price paid for package.

to choose their most preferred option. This allows researchers to evaluate the impacts of different attributes on respondents' welfare.

CE is based on two fundamental building blocks: Lancaster's characteristics theory (Lancaster, 1966) and Random utility theory (Adamowicz et al. 1994, Boxall et al. 1996). Lancaster's theory posits that choices can be modeled as a function of attributes of the alternatives relevant to a given choice problem. Random utility theory assumes that the alternative with the highest overall utility is selected. In this theory, the utility of an option i for individual t (U_{it}) is assumed to depend on environmental attributes of the option (Z_i) and the socio-economic characteristics of the individual (S_t). The utility function for a representative consumer can be decomposed into a systematic component or observable component and a random component or unobservable component by the analyst. The random utility function is shown as follows:

$$U_{it} = V(Z_i, S_t) + \varepsilon_{it}$$
$$U_{it} = V_{it} + \varepsilon_{it} \quad \text{.....(2)}$$

Where U_{it} is the total utility derived from alternative i by individual t, V_{it} is the vector of systematic or determinstic or observable portion of utility (indirect utility function) that individual t has from choosing alternative i, and ε_{it} is the vector of random or unobserable portion of the utility that consumer t has for choice alternative i (Adamowicz and Boxall, 2001).

In CE, the probability that any particular respondent prefers option *i* in the choice set to any alternative option *j*, can be expressed as the probability that the utility associated with option *i* exceeds those associated with all other options. Formally,

$$\Pr ob(i/C) = \Pr ob\{\ U_{it} > U_{jt}\ \}\ \ for\ \ all\ \ i, j \in C,\ \ i \neq j \quad \text{.....(3)}$$

$$= \Pr ob\{\ V_{it} + \varepsilon_{it} > V_{jt} + \varepsilon_{it}\ \}\ \ for\ \ all\ \ i, j \in C,\ \ i \neq j$$

Where **C** is the complete choice set. In order to estimate Equation (3), assumptions must be made over the distributions of the error terms (random variable). The usual assumption made is that the errors are Gumbel (extreme-value type I) distributed and independently and identically distributed across individuals and alternatives (McFadden, 1974). This leads to the use of what is known as multinomial logit model (MNL), and thus the probability of choosing an alternative '*i*' (*i = 1, 2,.., J*) from a set of *J* alternatives is chosen by individual t given as:

$$P_{it} = \frac{e^{\lambda V_{it}}}{\sum_{J \in C} e^{\lambda V_{jt}}}, V_i \neq V_j ; j \in C \quad \text{.....(4)}$$

Where ω is a scale parameter, which is inversely proportional to the standard deviation of the error term. This parameter cannot be separately identified and is therefore typically assumed to be 1 (i.e., a constant variance) (Hanley et al. 2006). $V_{it}\ \ and\ V_{jt}$ are the indirect utility functions assumed to be linear in parameters (Louviere et al. 2000).

When using the MNL models, choices must satisfy the Independence from Irrelevant Alternatives (IIA) property with an extreme value type I distribution (Gumbel) for the error term, which means that the addition or subtraction of any option from the choice set will not affect relative probability of individual t choosing any other option (Louviere et al., 2000).

To estimate the multinomial logit model, modeling constant known as Alternative Specific Constants (ASC) are included in the MNL model. The most basic form of V_i is an additive structure, which includes the attributes from the choice sets only,

$$V_{it} = ASC_i + \sum_k B_{ik} Z_{ik} \quad \text{.....(5)}$$

Where ASC_i is an alternative specific constant (ASC) for option i, Z_{ik} is the K^{th} attribute value of alternative i, and B_{ik} is the coefficient associated with the K^{th} attribute of alternative i. The effect of attributes in the choice sets are captured by Z variables while the ASC captures any systematic variations in choice observations that are not explained either by the attribute variation or respondents' observed socioeconomic characteristics (Ben-Akiva and Lerman, 1985). In multinomial logit with i options, there are $i-1$ ASCs.

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 (Morrison et al., 1999, Colombo et al., 2006). In this case the model is specified as:

$$V_{it} = ASC_i + \sum_k B_k Z_k + \sum \gamma_{it} \left(ASC_i * S_t \right) \quad \text{.....(6)}$$

Where S_t represents the socio-economic and/or attitudinal variables for individual t, and γ_{it} is the vector of coefficients associated with the individual socio-economic characteristics interacted with the ASC.

3.3.1 Random Parameter Logit Model (RPL)

The main drawback of the MNL model is that the Independence of Irrelevant Alternatives (IIA) seems to be restrictive in many empirical applications. This assumption requires that the ratio of probabilities of choosing two alternatives is independent of the presence of any other alternative. These make the parameter estimates from the MNL model biased if IIA assumption is violated. Moreover, MNL does not take into consideration correlations within each respondent's series of choices.

To avoid the problem associated with the MNL model, Revert and Train (1998) have proposed the use of the RPL model. This is due to the following advantage of the RPL relative to the MNL model. First, RPL is not subject to the IIA assumption. Second, it accommodates correlations among panel observations. Third, the procedure explicitly incorporates and accounts for heterogeneity in tastes across respondents by allowing the model parameters to vary randomly over individuals (Adamowicz and Boxall, 2001).

The random utility function for the random parameter logit model takes the following form:

$$U_{it} = V_{it} + \mathcal{E}_{it} = Z_i(B + \eta_t) + \mathcal{E}_{it} \quad \text{.....(7)}$$

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 component (V_{it}) and stochastic component $(\mathcal{E}_{it})$. The indirect utility is assumed to be a function of the choice attributes Z with parameters B (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:

$$P_{it} = \frac{e^{Z_{it}(B+\eta_t)}}{\sum e^{Z_{jt}(B+\eta_t)}} \quad \text{.....(8)}$$

As noted by Birol et al (2005), 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.

3.3.2 Part Worth

In a linear statistical model, the B coefficients estimated under the RPL model can be used to estimate the rate at which respondents are willing to trade-off one attribute for another. Given that the attribute being given up is a monetary attribute, the trade-off estimated is known as 'part-worth' or 'implicit price' or the' marginal willingness to pay'. They demonstrate the amount of money respondents is willing to pay in order to receive more of the environmental attribute:

$$Partworth = -1\left(\frac{B_{nonmarket\ attribute}}{B_{monetary\ attribute}}\right) \quad \text{.....(10)}$$

Estimates of part-worth (implicit price) are made on a 'ceteris paribus' basis – that is they are estimates of willingness to pay of respondents for an increase in the attribute of concern, given that everything else is held constant.

According to Bennett and Blamey (2001) in a linear utility function the marginal rate of substitution between two attributes, monetary and non-monetary, is the ratio of their coefficients. Thus, the implicit prices are useful in that they demonstrate the trade-off between individual attributes. A comparison of implicit prices affords some understanding of the relative importance that respondents hold to them. On the basis of such comparisons, policy makers can better placed to design resource use alternatives so as to favor those attributes, which have higher (relative) implicit prices.

Furthermore, the welfare changes from quality or quantity changes of an environmental attributes could be given by the measure of compensating surplus as (Bennett and Blamey, 2001, Birol et al., 2005):

$$CS = \frac{-(V_o - V_1)}{B_{monetary\ \ attribute}} \quad \text{.....(11)}$$

Where V_o represents the initial utility at the status quo and V_1 represents the indirect utility associated with environmental changes in various scenarios.

3.3.3 Specific Equation for Choice Experiment Model

Two different multinomial logit (MNL) models were estimated using the data collected from visitors of Semen Mountain National Park with Limdep 8 Nlogit 4.0. The first model, Model 1, is a basic specification which shows the importance of the choice attributes in explaining respondents' choices across the three different options/plans in the choice set: status quo option and two alternatives with changes in attributes. Thus, there are three indirect utility functions derived from the MNL model. Each represents the utility generated by one of the three options:

plan 3 is the status quo, while plans 1 and 2 involve an improvement in the attributes, relative to the 'status quo' plan. The levels of attributes in the choice sets determine the utility for each of the functions. The specification for this model is as follows:

Model 1: Basic MNL Model

The choice experiment modeling will be designed with the assumption that the observable utility function would follow a strictly additive form. The model will be specified in such a way that the probability of selecting a particular alternative will be a function of attribute of that alternative plan and of the alternative specific constant.

The indirect utility from the proposed environmental improvement would take the following form:

$$V_i = ASC + B_1 * IbexandWolf\ \ pop + B_2 * Afforestation + B_3 * Addititonal\ \ services + B_4 * entrance\ \ fee ...(12)$$

Where: $ASC = 0$ for plan 3 (status quo) and 1 for plan with improvement (plan 1 and 2), and $B_1, B_2, B_3, B_4\ and\ B_5$ are the coefficients associated with each of the attributes, increase in endangered wildlife (such as Walia ibex and Ethiopian wolf) population, afforestation, provision of additional services, and entrance fee respectively. More specifically, the three indirect utility functions (i=1, 2, 3) can be represented as:

$$V_1 = ASC_1 + B_1 * IbexandWolf\ \ pop + B_2 * Afforestation + B_3 * Addititonal\ \ services + B_4 * entrance\ \ fee$$
$$V_2 = ASC_2 + B_1 * IbexandWolf\ \ pop + B_2 * Afforestation + B_3 * Addititonal\ \ services + B_4 * entrance\ \ fee$$
$$V_3 = B_1 * IbexandWolf\ \ pop + B_2 * Afforestation + B_3 * Addititonal\ \ services + B_4 * entrance\ \ fee$$

Where: ASC_1 and ASC_2 are two alternative specific constants for plan 1 and 2. According to Bennett and Blamey (2001) the two ASCs for plans with improvements are constrained to be

equal, because of a generic format and an experimental design that was close to orthogonal were used to develop the choice sets and hence we included one common alternative specific intercept for the two alternatives that imply changes.

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 underpin 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 (AGE, FAMSIZE, INCOME, EDU, and GENDER) 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:

$$V_i = ASC + B_1 * IbexandWolf\ \ pop + B_2 * Afforestation + B_3 * Additional\ \ services + B_4 * entrance\ \ fee + \gamma_1 * ASC_i * AGE + \gamma_2 * ASC_i * FAMSIZE + \gamma_3 * ASC_i * INCOME + \gamma_4 * ASC_i * EDU + \gamma_5 * ASC_i * gender \quad (13)$$

3.3.4 Definition of Variables and Expected Sign in CE

ASC: This represents Alternative Specific Constant and takes values 1 for the attributes with changes (plan 1 and plan2 in the choice sets) and 0 for the base (status quo) option.

Walia Ibex and Ethiopian Wolf population (Ibex and Wolf pop.): This attribute refers to the number of Walia ibex and Ethiopian Wolves. Increasing the number of these endemic wild animals improves the attractiveness of the park for the visitors and thus is assumed to increase the utility of the respondent and the expected sign of its coefficient is positive.

Afforestation: This attribute stands for the number of new trees to be planted on degraded areas of the park and covering the surrounding degraded landscape with trees. This attribute is expected to have positive coefficient since it enables to restore the biotic contents (like different kind of endemic birds and wildlife) of the area, improve scenic view and thus expected to increase the utility of the visitors.

Additional Services: This attribute considers the improvement of existing services provided. These include enough and qualified tours guide and scout, improved infrastructure, library/museum, map, shops, protected tourist zone, swimming pool, showers and recreation huts. The improvement of these services is expected to enhance the wellbeing of the visitors of the park and thus the coefficient of this attribute is expected to be positive.

Entrance Fee: This is the amount of money that visitors are charged (in Birr) per day to visit the park. Its coefficient is expected to be negative because an increase in cost will decrease the utility of the respondents.

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.

FAMSIZE: 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.

INCOME: 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.

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.

GENDER: 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.

3.4 Design of a Choice Experiment

There are four steps involved in the design of a choice experiment: (i) definition of attributes, attribute levels and customization, (ii) experimental design, (iii) questionnaire development, and (iv) Choice of Sample and Sampling strategy. These four steps should be seen as an integrated process with feedback. The development of the final design involves repeatedly conducting the steps described here, and incorporating new information as it comes along. In this section, we focus on the first three steps.

3.4.1 Defining Attributes and Levels

The first step in undertaking choice experiment survey design is to identify the attributes and attribute levels to be included in the survey. Before deciding those attributes to be included in the survey, the importance of the attributes in choice decisions has to be recognized (Alpizar et al., 2001). Accordingly, the attributes and their levels that were included in this study were determined on the basis of initial consultations and focus group discussions with relevant staff at *Debark* center of SMNP and some local *Debark* residents. That is, the attributes included in the choice set should, one way or another, be relevant for the policy making process and also should give sense to the people who will answer the questions. In addition to this, the attributes should vary across levels that are considered realistic by respondents. After attributes are identified and defined, the levels of each attribute have to be determined. Otherwise the possibility of obtaining valid responses and response rate will reduce if the included attributes and/or the levels associated with each attribute are perceived as irrelevant by the respondent (Bennett and Blamey, 2001). Furthermore, the issue of customization is important in the selection of attributes and their levels. It is an attempt to make the choice alternatives more realistic by relating them to actual

levels which helps the respondents to have a better understanding. Accordingly, an alternative with the attribute levels describing today's situation were included which would then relate the other alternatives to the current situation- status quo as one of the alternatives in each choice set (Bradley, 1988).

The first attribute is increasing the number of Walia ibex and Ethiopian Wolf (Semen fox) population, which are endangered wildlife species. The Walia ibex has become a national symbol. It is endemic to the Semen Mountains, one of the most highly endangered mammal species in the world and is threatened by extinction due to low numbers (which is not more than 750 currently) and the very restricted area of remaining habitat. Similarly, the Ethiopian wolf lives in the SMNP only in afro-alpine habitats in isolated mountain massifs above 3600 meter above sea level. Being normally diurnal, this species has become nocturnal due to severe persecution and human pressure. All its habitats up to 4400 meter above sea level are occupied by grazing domestic animals accompanied by shepherds who chase the Ethiopian wolf or kill it in order to prevent losses of sheep (Nievergelt, 1996). In this regard, protecting the endangered species such as the *Walia ibex and Ethiopian Wolf* 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.

Afforestation is another attribute that will be used in this study. According to Nievergelt (1996) a destruction of indigenous forest, endemic flora, afro-alpine grassland and landscape increased very significantly since 1983. This is because of the size the population migrating to the area is continually increasing with a general population growth of about 2-3% as the pressure through settlement and cultivation is still rising (Puff and Sileshi, 1999). Intensive cutting of tree heather,

cutting of long grass in the ranges in and above the escarpment for coverage of roofs have changed the traditional Walia ibex habitats in the slopes above the escarpment in an intensive man-used zone. That means, more people need more cultivation area, need more fire wood, do more hunting, create more pollution and also people produce bush fires; keep dogs, which can interbreed with the Semen fox. Furthermore the high numbers of grazing cattle and other domestic animals have an extremely devastating effect on the afro-alpine grassland ecosystem. Road construction also causes a destruction of indigenous forest, endemic flora, afro-alpine grassland and landscape. For about 24 km, the road leads through the forest belt at an altitude of 3200 to 3800 m.a.s.l. It destroyed considerable parts of the valuable indigenous high altitude forest. The damage was increased by the careless side-tipping of spoil material. Earth cut from slopes or plateaus was dumped by road sides. Flora destruction by road construction can mean reducing the food and fodder of many animal species from small to large. So the food chain small rodents – Semen Fox, for example, is affected. In this respect, such factors, having rolled down the cliffs and gorges is spoiling the natural beauty of the surrounding land, chance of seeing large wildlife and birds decline, and killing unique flora with deteriorating scenic nature of the site and also may touch the mind of the visitors negatively. 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.

Additional services will be taken as the third attribute in this study. People have a wide range of motivations for visiting the park. In doing so, the tourists in need of improved infrastructure to reach the park, qualified tourist guides and scouts, information provision, map and protected tourist zone through buffering that enable them to have beautiful panoramic views, observation points for wildlife without any disturbance, traditional transportation (like renting mules, horses),

and also some tourists 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. But the site has failed to provide these services in qualified and/or in sufficient amounts. 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 few lodge which almost only gives service for foreign visitors as it is so expensive and also there is no enough Tents, Cabin and hotels services to stay overnight with in the park. To some extent, there is pension and hotels service at *Debark*, but still there are no enough transportation services and even not allowed to move in and out from the park with vehicles after 6:00 PM. Thus the provision of these facilities at convenient place and affordable price will attract the visitors. 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.

The last attribute is the monetary attribute we call entrance fee. The change in the entrance fee from its status quo level will enable visitors to have access to an improved recreational experience by solving the problems that will reduce the quality of the park.

Table 3.1: Description of the attributes and their levels

Attributes	Description	Levels
Ibex and Wolf pop.	The plan is to improve the condition and the level of abundance for endangered wildlife such as Walia Ibex and Ethiopian Wolf through establishing wildlife corridors, enlarging the core area, establishing buffer zone, reducing over grazing and the movement of others domestic animals like dog and local goats that threatened Wolf and Ibex respectively (that may results in loss of endemism through hybridization). Doing this enables to improve the quality of the site and increase the number of endemic animals.	A. 50% increase in the number of Ibex and Wolf B. 100% increase in the number of Ibex and Wolf C. 150% increase in the number of Ibex and Wolf D. No change (currently 750 Ibex and 200 Wolf)*
Afforestation	This plan focuses on preserving and rehabilitating the health of ecological functions and services. It is possible to restore the ecological services through afforestation of the degraded area with native plantations and drying up the source of deforestation like human pressure through cultivation and encroachment, overgrazing, and road construction. These enable to restore the biotic contents (like different kind of endemic birds and wildlife) of the area, improve scenic view and encourage the non agricultural activities including ecotourism.	A. Planting 1,000,000 new trees B. Planting 2,000,000 new trees C. Planting 3,000,000 new trees D. No new plantation of trees*
Additional services	The program enhances and improves the condition, quality and quantity of different services by classifying as to reach the site services (like: information desk, improved infrastructure, and map), on-site services (such as: health and medical treatment, enough and trained Tour guides and scouts, protected tourist zone, shops, showers, swimming pool and traditional transportations like renting mules, horses) and after visiting the park services[2]. This provision will increase the attraction of the park.	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	Changing the existing entrance fee/ charging an entrance fee that is higher than the fee charge to visitors at the present and 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.

3.4.2 Experimental Design

It is the second step in designing choice experiment. Experimental design is concerned with how to create the choice sets in an efficient way, i.e. how to combine attribute levels to form profiles of alternatives and combination of alternatives to form 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).

Four attributes are included in this study: ibex and Wolf population, afforestation, additional services, and entrance fee. 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, from the eighty one possible combinations, five optimal choice sets were created using SAS in orthogonal design method using the OPTEX procedure. 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 one of the following Plans do you prefer?

Attributes	**Plan 1**	**Plan 2**	**Plan 3 (Status quo)**
Ibex and Wolf Population	150% increase in their number	50% increase in their number	No change (Currently 750 Ibex and 200 Wolf)
Afforestation	Planting 2,000,000 new trees	Planting 2,000, 000 new trees	No new plantation of trees
Additional services	Provision of on-site and after visiting the park service	Provision of after visiting the park service	No improvement
Entrance Fee	50% increase	150% increase	No change
Choose one by putting a tick mark (√)			

3.4.3 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 was classified into four parts. The first part includes 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 showed 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.

CHAPTER FOUR

EMPIRICAL RESULTS AND DISCUSSION

4.1 Descriptive Statistics

Last year the Semen Mountain National Park had 16838 visitors, of which 15232 were foreigners which is about 90 percent of the total visitors. The study is conducted based on a sample of 140 foreign and 60 local visitors which comprises 70 and 30 percent respectively this is due to the fact that most of the visitors were foreign. Most of the respondents were Europeans which accounts for 80 percent of foreign respondents followed by American respondents. All of the visitors have said that their visitation rate is 1. As it can be looked at in table 4.1 below, Out of total visitors, males are 62 and 43 while females are 78 and 17 for foreign and local respondents respectively. The average age of the respondents was 47.79 and 30.97 years, the mean family size of respondents was 3 and 4, and the mean years of education was 16 and 15 years respectively for foreign and local respondents. The average income was calculated as 44,492 birr (2,696.5 US$) and 2,927 birr (177.4 US$) per month and most of the respondents were public sector employees which accounts for 64 and 68 percent for foreign and local respondents respectively. The socioeconomic survey result also indicates that about 55 percent of foreign and 37 percent of local respondents have reported to be married. Most of the local respondents were single this is due to the fact that they are students and young graduated.

Average total planned trip costs were Birr 33,838.75 and 1,390.8 of which the cost of Semen Park portion of the trip representing almost one-fourth and more than half of all trip costs for foreign and local visitors respectively. This portion included both travel costs and on-site staying costs for Semen Park. The average number of days of stay on the park was found to be 3.05 and

2.17. Regarding the years of acquaintance of visitors with the site, the data show average years of 2.26 and 8.78 for foreign and local respondents respectively. The proportion of visitors travelling in group was almost the same (which was about 90%) for foreign and local visitors.

Actual cost (which is the sum of travel cost per round trip and on-site staying cost on the park) and the maximum willingness to pay (MWTP) are the two most important variables that will be used to determine the consumer surplus. Thus, visitors were asked their travel cost, on-site staying cost and maximum willingness to pay for the park during last year. Here there is a difficulty in computing the travel cost specifically spent for the Semen Park due to the fact that most of the visitors were multi-site visitors, which comprise 96 and 38 percent, and package users which contains 86 and 36 percent of foreign and local respondents respectively. That is most of the respondents combined their Semen Park trip with trips to other sites, such as Bahir Dar, Gondar, Axum, Lalibela, Addis Ababa, Hawssa etc and they were charged a single price for the entire package. That is, information on transportation costs and package cost obtained from the questionnaire covered the cost of a visitor's whole trip, and not just the trip to the Semen Park. In order to estimate the recreational economic benefit of the park, the travel cost for visiting the park had to be identified from within the total cost of the trip. We tried to address this problem using the equation given in the methodology part which gives an approximate value. Accordingly the mean travel cost per round trip to the park were reported as birr 3874 for foreign respondents, and birr 365 for local respondents. Travel costs consisted of both money spent for transport and opportunity cost of time while in travel.

Table 4.1:Descriptive statistics of the socioeconomic and trip characteristics of the respondents

Variable	Description of the variables	Foreign visitors	Local visitors
		Mean (Std.dev.)	Mean (Std.dev)
Socio-economic Characteristics			
GENDER	Gender dummy variable (1 = male and 0 = female)	.44 (.49)	.72 (.45)
AGE	Age of respondents (years)	47.79 (14.14)	30.97 (8.27)
FAMSIZE	Total number of people in the visitor's household	3.06 (1.70)	3.7 (1.89)
EDU	Visitor's educational level in years of education	16.16 (2.98)	14.93 (2.76)
INCOME	Disposable monthly income of visitor (in Birr)	44492.64 (21891.37)	2927.12 (1632.19)
NATION	Nationality of the visitor (dummy as 1 = foreign and 0 = local visitors)[2]	.7 (.46)	.3 (.45)
MARSTSTUS	Marital status of the visitors (dummy as 1 = married and 0 = otherwise)	.55 (.50)	.37 (.49)
EMP	Visitor's basis of employment (dummy as 1 = full time and 0 =otherwise)	.643 (.481)	.68 (.47)
Trip Characteristics of the Respondents			
TOTCOST	Planned total cost for all trip in Ethiopia (in Birr)	33838.75 (15786.28)	1390.833 (827.98)
TC	Total travel cost associated with a round trip to and from the park (in Birr).	3874.016 (1324.693)	365.233 (187.80)
STAYCOST	Amount of on-site cost on the park (in Birr)	1845 (1540.83)	313.2282 (161.02)
DAYSSTAY	Number (#) of days stay on the park	3.05 (1.88)	2.17 (.98)
KNOW	Respondents have known the park (# of years)	2.26 (1.98)	8.78 (4.81)
MWTP	Maximum amount visitor would have spent on trip (# of times the present cost)	1.56 (.39)	1.6 (.39)
GRO	Respondent's travels in group (dummy as 1 = yes and 0 = no)	.89 (.32)	.9 (.30)
PACKAGE	Whether respondents use package (dummy as 1 = yes and 0 = no)	.86 (.34)	.36 (.48)
VISITOTH	Whether respondents visit other sites (dummy as 1 = yes and 0 = no)	.96 (.19)	.38 (.49)
Number of Respondents		140	60

Source: computed from the survey data

[5] Unlike other variables, the values for this one are computed from the total (i.e., by combine foreign and local respondents).

4.2 Estimation of Annual Consumer Surplus and Recreational Economic Value

Table 4.2: consumer surplus and recreational economic value of SMNP (in birr)

Visitors	**Actual Price Paid**		**Consumer Surplus**		**Recreational Economic Value**	
	All visitors	Per visitor	All visitors	Per visitor	All visitors	Per visitor
Foreign visitors	87111808	5719	47935104	3147	135046912	8866
Local visitors	1089590.7	678.45	626982.4	390.4	1716573.1	1068.85
Total	88201398.7		48562086.4		136763485.1	

Source: Calculated from survey data

The annual tourist spending on park, calculated by multiplying the average actual cost (actual price paid) by the number of visitors to the park for the study period of March 2010 up to February 2011 (15232 foreign and 1606 local visitors), was about Birr 87,111,808 (US$ 5,279,503) and Birr 1,089,590.7 (US$ 66,035) respectively for foreign and local respondents and totally Birr 88,201,398.7 (US$ 5,345,539). The average maximum willingness to pay was given as 1.56 and 1.6 of the present cost for foreign and local respondents respectively (see table 4.1). Accordingly the average annual consumer surplus was calculated from Equation 1 which is given by the difference between maximum price and actual price paid for 140 and 60 valid surveys reported as Birr 3147 and 390.4 per person per annum for foreign and local respondents respectively.

Accordingly, the annual total consumer surplus[3] was estimated to be Birr 48,562,086.4 (US$ 2,943,156.7) reflecting the annual recreational economic benefit (maximum revenue) of the park but the park authority collects only 14 percent of this sum. This figure is the value of the benefit that visitors gained by visiting the park. It also reflects the amount that visitors are willing to pay to enjoy the park' natural resources. This figure, however, does not include the non-use value of Semen Park. With one visit, international tourists received more surplus than domestic tourists (i.e., Birr 47,935,104 in comparison with Birr 626,982.4). Their gained surplus per head was also too higher than that of domestic tourists, implying that foreign tourists gleaned greater enjoyment from the Semen Park than their local counterparts. International tourists valued the natural resources of the Semen Park more than domestic tourists.

The total recreational economic value equals the total consumer surplus plus the total price paid. The annual monetary recreational economic value of the SMNP is about Birr 136,763,485.1 (approximately US$ 8.3 million). This is the value that the park yields every year for the economy due to the presence of the park. However, this is not the revenue of park only. This value is distributed firstly, in the form of the consumer surplus of visitors who have gained recreational benefit from Semen Park and then, in terms of the prices paid to transportation companies and agents for providers of services such as hotels, restaurants, tourist agencies or package providers, etc. A very small part of the estimated recreational economic value of Semen goes to the park through expenditures on entrance fee and different services on the park.

[6] This is the sum of the total surplus value for foreign and local visitors respectively given as about Birr 47,935,104 (US$ 2,905,157.8) and Birr 626,982.4 (US$ 37,999) for foreign and local visitors.

4.3 General Perception and Observation about the Semen Park

Table 4.3 Major problems at the site that reduce the park qualities

Degree	Foreign Respondents		Local Respondents	
	Frequency	Percent	Frequency	Percent
Forest and landscape degradation of the area	45	32.2	14	23.3
Severe cold	24	17.2	9	15
Lack of protected tourist zone	20	14.2	11	18.3
Lack of appropriate resting facility in the park	18	12.8	8	13.3
Difficulty to see the endemic wildlife animals due to insufficient number	33	23.6	18	30
Total	**140**	**100**	**60**	**100**

Source: Computed from the survey data

Even if most of the respondents indicated that the recreational quality of the park is good, respondents were also asked to rank the major problems of the park. The responses were summarized in the above table.

Forest and landscape degradation of the area, which comprises 32 percent, was ranked as the first major problem in reducing the recreational quality of the park by foreign respondents. This is due to the fact that the park quality is deteriorating mainly because of road construction, widespread deforestation and grass burning, agriculture, firewood collection, hunting and domestic livestock grazing. Difficulty to see the endemic wild animals due to insufficient number, severe cold, lack of protected tourist zone, and lack of appropriate resting facility in the park are the second, third, fourth and fifth problems respectively ranked by foreign respondents.

Difficulty of seeing the endemic wild animals due to insufficient number was ranked as the first major problem in reducing the recreational quality of the park by local respondents. The second, third, fourth and fifth major problems ranked by local respondents respectively were forest and landscape degradation of the area, lack of protected tourist zone, severe cold, and lack of appropriate resting facility in the park.

These responses could serve as supporting evidences to undertake the current study that proposes improvement plans relative to the current situation.

Visitors were also asked to choose park attributes that attracted and made them to visit the park. Since each of the attributes was not independent, respondents were allowed to choose more than one answer that can justify their choice. Accordingly, 95 and 97 percent of foreign and local respondents were attracted with endemic animals and bird watching. About 92 and 90 percent of foreign and local respondents were interested in the beauty of the naturally green landscape of the park. Mountain trekking and site seeing, and get away from cities and crowds attracted 85 and 45 percent of the foreign and 55 and 18 percent of local respondents respectively. The proportion of visitors who gave research and/or course related as well as sharing experience with society as causes of attraction were 36 percent of local and 40 percent of foreign respondents respectively.

4.4 Econometric Results for Choice Experiment

The data were coded according to the level of the respective attributes. Thus, for Walia ibex and Ethiopian wolf population, 150% increase in their number was coded as 3; 100% increase in their number was coded as 2 while 50% increase in their number was coded as 1. For additional services, provision of to reach the site, on-site and after visiting the park service was coded as 3, provision of on-site and after visiting the park service was coded as 2 while provision of after visiting the park service was coded as 1. 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 currently per day). 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).

4.4.1 Estimation and Discussion of Results

Using 700 and 300 observations elicited from 140 foreign and 60 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 8.0 NLOGIT 4.0 for the basic and extended models (include individual covariates). In table 4.4 and 4.5, 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), respectively for foreign and local visitors. In addition to this, the random parameter logit model was estimated to address unobserved preference heterogeneity and possible violation of the IIA assumption. 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 4.4 and 4.5.

Table 4.4 Results of the Multinomial logit model for foreign visitors

Variables	Model 1 (Attributes only)		Model 2 (Attributes and Socioeconomic Character tics)	
	Coeff. (P-value)	Std.err.	Coeff. (P-value)	Std.err.
ASC	1.6478 (0.0028)	.5510	−2.2409 (0.095)	1.3422
Entrance fee	−.9115E-02*** (0.0000)	.2102E-02	−.9035E-02*** (0.000)	.2106E-02
Ibex and wolf pop.	.3875*** (0.0000)	.7213E-01	.3887*** (0.0000)	.7215E-01
Afforestation	.2441E-06*** (0.0014)	.7661E-07	.2455E-06*** (0.0000)	.7663E-07
Additional services	.1455* (0.0792)	.8290E-01	.14778* (0.0749)	.8296E-01
ASC*AGE			.8069E-02 (0.6124)	.1592E-01
ASC*FAMSIZE			.1348 (0.3052)	.1315
ASC*INCOME			.1007E-05 (0.9334)	.1206E-04
ASC*EDU			.2317*** (0.0038)	.7999E-01
ASC*GENDER			−.9213** (0.0324)	.4307
Summary Statistics				
Log-likelihood	−510.1917		−502.6255	
Pseudo R^2	0.213		0.226	
Number of obs.	700		700	

*** Significant at 1% level; ** Significant at 5% level; * Significant at 10% level

In both models, the three attributes (Walia ibex and Ethiopian wolf population, afforestation, and additional services) have the expected positive signs and the first two coefficients of the attributes are statistically significant at 1% and the last at 10% level which implies all 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 and magnitudes. 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, foreign visitors gave value for park improvement plans which result in greater number of Walia ibex and Ethiopian wolf, 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. 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. 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.

Model 2 represents the interactions of the socioeconomic characteristics with ASC. Among the co-variants age, family size, and income are positive and insignificant. This implies that the involvement of these variables is not a significant factor in affecting the probability of choosing the improved plans. But the coefficient of interaction of ASC with years of education are positive and significant implying that as years of education increases, the probability of choosing the improved scenario options increases, ceteris paribus. Moreover the coefficient of interaction of

ASC with gender is negative implying that the probability of choosing the improved option is higher for female as compared with male, other things being constant. The positive coefficient of family size was not expected to be negative but it is insignificant.

The inclusion of the socioeconomic variables improves the explanatory power of the model. The overall explanatory power can be assessed using both the value of log-likelihood and the McFadden's (pseudo R^2) which allows us to compare the fit of different models (Birol et al., 2005). The larger the value of log-likelihood, the better is the fit of the model to the observed data (Sasao, 2004) and also the larger the value of pseudo-R^2, the better is the fit of the model to the observed data (Christie et al. 2004). Pseudo R^2 statistic value between 0.2 and 0.4 are said to be adequate (Birol et al., 2005, Bennett and Blamey, 2001). Accordingly, in this study the reported R^2 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.

The coefficient of the Walia ibex and Ethiopian wolf population attribute is greater than that of afforestation and additional services attributes which indicates that foreign visitors give relatively greater emphasis to the increase in the number of wildlife animals such as Walia ibex and Ethiopian wolf population, which are endemic, than others.

Table 4.5 Results of the MNL for local visitors

Variables	Model 1 (Attributes only)		Model 2 (Attributes and Socioeconomic character tics)	
	Coeff. (P-value)	Std.err.	Coeff. (P-value)	Std.err.
ASC	.2710 (0.7482)	.8441	-3.4839 (0.0399)	1.6955
Entrance fee	-.3368E-01*** (0.0027)	.1478E-01	-.3377E-01** (0.0233)	.1488E-01
Ibex and wolf pop.	.4060*** (0.004)	.115	.4060*** (0.000)	.1152
Afforestation	.2102E-06*** (0.000)	.1208E-06	.2094E-06*** (0.004)	.1213E-06
Additional services	.9293E-01* (0.0819)	.1331	.9255E-01* (0.0843)	.1342
ASC*AGE			-.2275E-01 (.4905)	.3451E-01
ASC*FAMSIZE			.7986E-02 (.5098)	.1017
ASC*INCOME			.1037E-02*** (.0000)	.2235E-03
ASC*EDU			.1800** (.0142)	.7345E-01
ASC*GENDER			-.6171 (.1842)	.4648
Summary Statistics				
Log-likelihood	-276.2851		-246.1142	
Pseudo R^2	0.173		0.234	
Number of obs.	300		300	

*** Significant at 1% level; ** Significant at 5% level; * Significant at 10% level

Similar to the results for foreign visitors, the results for local visitors shown in Table 4.5 indicate that the coefficients of the three attributes (Walia ibex and Ethiopian wolf, and afforestation) have the expected positive signs and are statistically significant at 10 % level or less which implies all attributes are important determinants in the choice of the park's resource management. Moreover, the monetary attribute "entrance fee" has the expected negative sign and statistically significant at 1% level suggesting that the effect on utility of choosing a choice set with a higher price level is negative.

In Model 2, the sign of the variables income and years of education are positive and significant suggesting that the probability of choosing the improved scenario options increases as the values of these variables increase, ceteris paribus. In this case also, the inclusion of the socioeconomic variables improves the explanatory variables of the model. The log-likelihood and pseudo R^2 which represents the overall explanatory power of the model is also high for the extended model (model 2) relative to that of model 1. Finally, here also the coefficient of ASC has the same implication as in the foreign visitors.

Local visitors also gave relatively greater emphasis to the increase in the number of wild animals such as Walia ibex and Ethiopian wolf than other attributes as reflected in the magnitude of the coefficient of the Walia ibex and Ethiopian wolf population attributes which is greater than that of afforestation and additional services attributes.

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. This was tested by using Hausman's test whether the IIA assumption holds in the MNL model or not. 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.

Even if the standard Hausman test could not be completed as the difference matrix was not positive definite and hence the violation of the IIA assumption is not known in the MNL model, 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 for both foreign and local visitors are reported in Table 4.6:

Table 4.6 Results of the RPL Model for both foreign and local visitors with attributes only

Variables	**For Foreign Visitors**		**For Local Visitors**	
	Coeff.(P-value)	**St.err.**	**Coeff.(P-value)**	**St.err.**
ASC	1.6435 (0.0031)	.55489773	.2525 (0.7679)	.8555
Entrance fee	-.9362E-02*** (0.0003)	.2610E-02	-.3496E-01** (0.0355)	.1663E-01
Ibex and wolf pop.	.3973*** (0.0000)	.9433E-01	.4178*** (0.0000)	.1328
Afforestation	.2540E-06*** (0.0099)	.9843E-07	.2217E-06*** (0.0000)	.1369E-06
Additional services	.1509* (0.0927)	.8978E-01	.1014*** (0.0017)	.1416
Summary statistics				
Log-likelihood	-451.1917		-226.2349	
Pseudo R^2	.3361		.262	
Number of obs.	700		300	

*** Significant at 1% level; ** Significant at 5% level; * Significant at 10% level

For both groups of visitors, the difference between the MNL model and the RPL model with respect to the magnitude and the sign of the coefficients of the attributes is small. 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 R^2, is better. The pseudo R^2 in this case is 0.3361 and 0.262 which are better than the respective values for the MNL model for foreign and local respondents respectively.

4.4.2 Estimation of the Marginal Willingness to Pay

The rate at which respondents are willing to trade off price for changes in any of the other attributes were calculated from the parameter estimates, i.e., the implicit price. Implicit price is the marginal rate of substitution between each attribute and the monetary attribute (Bennett and Blamey, 2001). It shows the amounts of money respondents are willing to pay for an improvement in the environmental attribute. 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 (10) and the results are reported in Table 4.7 for both foreign and local respondents.

Table 4.7 Estimates of Marginal WTP[4] (in birr) for each attribute

Variables	For Foreign Visitors		For Local Visitors	
	Coeff.(P-value)	St.err.	Coeff.(P-value)	St.err.
Ibex and wolf pop.	42.5049*** (.0006)	15.01	12.0537*** (.0009)	7.51
Afforestation	.2678E-04*** (.0000)	.13E-04	.6241E-05*** (.0000)	.55E-05
Additional services	15.9665*** (.0085)	11.87	2.7594*** (.0045)	4.870

*** Significant at 1% level; ** Significant at 5% level; * Significant at 10% level

From table 4.7, we observe that the implicit price for all attributes are positive and significant, implying that respondents have a positive WTP for an increase in the quality or quantity of each attributes. The implicit prices suggest that foreign respondents are willing to pay about 42.5 birr

[4] For each attribute, the MWTP is presented in per day as the monetary attribute is taken only for one day.

per day for an increase in the level of Walia ibex and Ethiopian Wolf animals, other thing being constant. That is, foreign visitors are willing to pay this amount for each increase in the level of Walia ibex and Ethiopian wolf population from the status quo level. As well, foreign respondents are willing to pay Birr 0.00002678 per day for afforestation and 15.9 Birr per day for an increase in the level of improved additional services which is relatively low in terms of change in the level, *ceteris paribus.* The MWTP for afforestation indicates the amount of money that foreign respondents are willing to pay for one additional new tree. The MWTP is higher for Walia ibex and Ethiopian Wolf attribute compared to the afforestation and additional services i.e., foreign visitors gave more value for Walia ibex and Ethiopian Wolf population attribute than others attributes.

While estimates of the implicit prices (MWTP) for each of the non-monetary attributes of the local visitors show that local visitors are willing to pay an additional fee of about Birr 12.05 per day for an increase in the level of Walia ibex and Ethiopian wolf population attribute, about 0.0000062 Birr per day for each new tree plantation and 2.76 Birr for an increase in the level of improved additional services attribute from the status quo level. That is, local visitors also gave more value for a change in Walia ibex and Ethiopian Wolf population attribute than other attributes. Generally, for each change in the level of attributes foreign visitors were willing to pay higher amount as compared with local visitors. This implies that they gave higher attention for conservation and improvement of the different attributes of the park than local visitors.

4.4.3 Estimation of Welfare Measures

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.

Economic welfare measurement involves an investigation of the difference between the utilities of the individuals that could be achieved under the status quo and changed scenario alternatives which is computed by using equation (11). Welfare measures can be estimated using the parameter estimates of the RPL model and values (levels) of the attributes. To compute, first, the values of the attributes in the status quo alternatives are substituted into the indirect utility function. Next, the values of the attributes in changed situation of scenarios are substituted into the indirect utility function. The value of the alternative with a changed situation is, then, subtracted from the value in the status quo alternative and finally multiplying this by the negative inverse of the coefficient of the monetary attribute (Bennet and Blamey, 2001).

In this paper, the following three alternative scenarios have been used to illustrate the overall WTP for improvements with respect to the status quo:

Current situation/status quo scenario

- No increase in the number of Walia ibex and Ethiopian wolf population
- No new plantation of trees
- No improvement in provision of additional services

Improvement scenario 1 (High impact improvement scenario)

- 150 percent increase in the number of Walia ibex and Ethiopian Wolf
- 3 million new trees to be planted
- Provision of to reach the site, on-site and after visiting the park services

Improvement scenario 2 (Medium impact improvement scenario)

- 100 percent increase in the number of Walia ibex and Ethiopian Wolf
- 2 million new trees to be planted
- Provision of on-site and after visiting the park services

Improvement scenario 3 (low impact improvement scenario)

- 50 percent increase in the number of Walia ibex and Ethiopian Wolf
- 1 million new trees to be planted
- Provision of after visiting the park services

Table 4.8 Estimates of Compensating Surplus[5] from the status quo to potential scenarios

	Foreign Visitors	Local Visitors
Scenarios	**WTP per day in Birr (US$)**	
Improvement scenario 1	432.4(26.2)	70.8(4.3)
Improvement scenario 2	347(21)	49.6(3)
Improvement scenario 3	261(15.8)	28.4 (1.72)

	Attribute levels		
	Ibex & Wolf Pop.	**AFF**	**SER**
Status quo	0	0	0
Scenario 1	3	3000000	3
Scenario 2	2	2000000	2
Scenario 3	1	1000000	1

[5] Implies the change in income that would make an individual indifferent between the initial (current environmental quality) and subsequent situations (higher environmental quality) assuming the individual has the right to initial utility level.

The welfare change arising from shifts from the status quo to the three scenarios described above was calculated using equation 11 and its results are presented in table 4.8. The values can be interpreted as the price that the respondents are willing to pay for the change from the status quo to the corresponding scenarios. In other words, this measure indicates the amount that respondents are willing to pay in order to experience an improvement in their utility which results from the status quo to the changed alternative scenarios. Based on the RPL model which has a better goodness of fit, the mean WTP of foreign visitors is Birr 261 and Birr 28.4 by local visitors per person per day to have scenario 3 in the attributes from the status quo, whereas under the medium impact improvement scenario the mean WTP of foreign visitors and local visitors increases to Birr 347 and 49.6 per person per day respectively. Finally the WTP for the high impact improvement scenario is obtained as 432.4 birr and 70.8 birr per person per day by foreign and local visitors respectively. The results were consistent across the range of policy options used in this study and as expected. Based on the above results, we can compute the total economic welfare (benefit) of the park for each change in hypothetical scenarios from the current level. For instance, for high impact improvement scenario from the current level, the total WTP is given by Birr 20,069,683.2 for foreign and 246,739.4 for local visitors and the total WTP will be Birr 20,316,422.6 per annum.

4.5 Analysis of the Results of the Follow up Questions

Respondents were asked questions that describe the reason why they made their choices in answering the choice set exercises. The results are presented in the following table:

Table 4.9 Results of Follow up Questions

No.	Follow up questions	% of Response	
		Foreign visitors	Local visitors
1	The proposed measures were good but I didn't have the ability to pay and thus I chose the status quo.	2.2	5
2	I chose the status quo option because of an objection to the amount of entrance fee.	–	–
3	I exclusively chose the cheapest plan whatever its levels.	8.5	6.6
4	I found that the increase in endemic Walia ibex and Ethiopian wolf population attribute is important and thus gave a priority for choice of the highest level of this attribute.	43.6	36.8
5	I found that afforestation attribute is important and thus gave a priority for choice of the highest level of this attribute.	30	30
6	I found that improving the additional services attribute is important and thus gave priority for choice of this attribute.	15.7	21.6
Total		**100**	**100**

Source: Computed from the survey data

All respondents have answered the follow up questions presented after the choice experiment exercises. From those respondents, 43.6 percent of the foreign respondents and 36.8 percent of the local respondents replied that they gave the top priority for increase in the Walia ibex and Ethiopian wolf population because they are endemic and need to see them easily. About 30 percent of both foreign and local respondents made their choices the highest level of afforestation. While about 15.7 percent of foreign and 21.6 percent of local visitors gave priority for the provision of improved additional services, about 8.5 percent of foreign and 6.6 percent of local respondents always choose the cheapest alternative. The rest (2.2 percent of foreign and 5 percent of local respondents) chose the status quo option indicating that though the proposed measures are appropriate, they did not have the ability to pay. We can also deduce from the results of follow up questions that both foreign and local visitors have the same perception for the improvement of different attributes of the park.

CHAPTER FIVE

CONCLUSTION and RECOMMENDATION

5.1 Conclusions

The SMNP has excellent potential and represents one of the most wonderful natural areas due to its naturally endowed resources. The main spectacular attractions of the area include its rich biodiversity, its high number of endemic species, its paramount bio-physical features such as steep cliff, escarpments, landscape and cool climate, and the yet unchanged traditional life of the local people, trekking, mountain hiking and ecological studies. But now the Park was inscribed on the List of World Heritage in Danger due to the evidence of recent deterioration of the population of endemic wild animals, agricultural encroachment and human settlement, loss of biodiversity, grazing and the impacts of road construction. This is due to lack of sustainable income from internal sources to support improvement and expansion projects. Thus, understanding the recreational value of natural resources of the park is fundamental to effective conservation programs. That is, when natural resources are damaged by human activities, their recreational value is greatly reduced along with their potential contribution to conservation programs. Therefore, it is important to estimate how much value people attach to this park so as to demonstrate how the respective authorities can extract additional revenue to improve the qualities and expand the types and varieties of their services. In doing so two standard environmental valuations techniques were applied namely travel cost and choice experiment methods.

The travel cost method of valuation depends on information about the amount of money and time visitors spend to reach that site. Here, actual cost which is the sum of travel cost per round trip and on-site staying cost, and the maximum willingness to pay (MWTP) are the two most important variables that we used to determine consumer surplus. Accordingly, the average consumer surplus per person was estimated to be Birr 3147 and 390.4 for foreign and local respondents respectively. This translates in to an expected aggregate annual recreational economic benefit of Birr 48,562,086.4 (approximately US$ 2,943,156.7) which reflects the value of the benefit that visitors gained by visiting the park. Even if the Park had a much larger economic potential than was actually realized, records show that the park was getting only 14 percent of the potential recreational economic benefit of the site for the survey 12 months.

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 endemic wild animals, lack of protected tourist zone, and lack of appropriate resting facility in the park.

Both foreign and local 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 of Walia Ibex & Ethiopian Wolf animals, 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.

5.2 Recommendations

The park authority should increases the current price for different services that is given in the park. This is because the recreational economic benefit of the park is so large. This enables the concerned authority to have a higher income to support improvement and expansion of the types and quality of the recreational services. 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 endemic wild animals such as Walia Ibex and Ethiopian Wolf animals, 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.

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APPENDIX A

Questionnaire

Addis Ababa University

School of Economics

A Travel Cost and Choice Experiment Survey Questionnaire for Estimating the Annual Economic Benefit of Semen Mountain National park

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Date of interview_____ **Interview ended** _____

Interviewer name _____ **Interviewee number** _____

Interview started _____ **Supervisor** _____

Hello, how are you. Thank you in advance for giving time for this interview. I am _____. This interview is a main body of a research Mr. Ali Yibrie is working with and he is currently studying at the Addis Ababa University. This research is in partial fulfillment for the awarded of MSC in economics. He is conducting a survey which focuses on valuation of and improvements to Semen Mountain National Park. Now you are randomly selected and asked to give about your travel and on-site information, your perception and observation regarding the park and to indicate your preferred choice for the options that will be provided. The information will help the government and thus policy makers to make informed decisions about the park. Moreover, it will enable to design an appropriate policy for development, conservation and sustainable use of the park by the concerned body. Whatever information you provide will be kept strictly confidential.

I. Demographic Characteristics of the Respondent

1. Gender? 1. Male ☐ 2. Female ☐
2. Age? _____ Years.
3. Marital status (please tick one): 1. Single ☐ 2. Married ☐ 3. Separated/Divorced ☐ 4. Other ☐ (e.g. cohabitation without marriage) please Specify _____
4. Household size _____ (No. of family members)
   No. of Adults_____ No. of Children (those less than 15 years) _____
5. Years of formal education_____ (in years completed).

6. Occupation: 1. Public sector employee ☐ 2. Private sector employee ☐ 3. Own business ☐ 4. Student ☐ 5. NGO ☐ 6. Unemployed ☐ 7. International organization ☐ 8. Other ☐ (please specify_____)
   - Basis of employment: 1. Full time ☐ 2. Part time ☐ 3. other ☐ please specify _____
7. What is your personal disposable monthly income _____in currency 1. USD ☐
   2. Euro ☐ 3. Birr ☐ 4. Pound ☐ 5. Other ☐ (please specify_____).
8. How many people in your family (including yourself) earn their own income _____ and what is their gross income _____ either from employment or business or others activities?
9. Nationality: 1. Ethiopian National ☐ 2. Foreign National ☐ (Specify_____).

II. Respondents' Views on Travel and Visitations

1. What is your primary origin (your country) for visiting this park? _____
2. What is your mode of transport from:
   - Your home to your accommodation in Ethiopia 1. Air ☐ 2. Other ☐ (Please specify_____)
   - Your accommodation in Addis Ababa to and from Semen Mountain National Park? (Multiple answer is possible)
     1. Air ☐ 2. Own Vehicle ☐ 3. Public Transport ☐ 4. Rented 4WD ☐ 5. Rented Coaster 5. Others ☐ (please specify_____).
3. If you are using package for travelling, from which Ethiopian Tour Operator you bought your package Tour? _____
   - Which kinds of services are included in your package _____? (Multiple answer is possible) 1. Tour guiding (leader) ☐ 2. Transportation ☐ 3. Half Board Meal ☐ 4. Full Board Meal ☐ 5. Accommodation ☐ 6. Entrance Fee ☐ 7. Local guide fee ☐ 8. Others ☐ please specify _____, _____, _____.
4. How much money do you plan to spend for total trip in Ethiopia? _____ in currency 1. USD ☐ 2. Euro ☐ 3. Birr ☐ 4. Pound ☐ 5. Other ☐ (please specify_____)

5. Give an estimate of your **total traveling cost** incurred for transport only, also **return includes**, for travelling:
    - From your home to and from your accommodation in Addis Ababa, Ethiopia _____ in currency 1. USD ☐ 2. Euro ☐ 3. Birr ☐ 4. Pound ☐ 5. Other ☐ (please specify_____)
    - From your accommodation in Addis Ababa to and from Semen Mountain National park _____ in currency 1. USD ☐ 2. Euro ☐ 3. Birr ☐ 4. Pound ☐ 5. Other ☐ (please specify_____)
    - If you are going through package, how much money you incur for total trip _____ in currency 1. USD ☐ 2. Euro ☐ 3. Birr ☐ 4. Pound ☐ 5. Other ☐ (Please specify_____) and for how many days _____.
    - If you are participating in social supporting services, how much money you spend for charity purpose, local community supporting and others _____ in currency 1. USD ☐ 2. Euro ☐ 3. Birr ☐ 4. Pound ☐ 5. Other ☐ (please specify_____)
6. From where you are starting your visitation in Ethiopia _____
7. From where you are directly going to Semen Mountain National Park _____
8. What is the maximum amount of money you would have paid to take the trip beyond your present cost if you are asked to pay? 1. **Not willing** to pay beyond the present cost 2. **1.5 times** of the present cost ☐ 3. **2 times** of the present cost ☐ 4. **2.5 times** of the present cost ☐ 5. **3 times** of the present cost ☐
9. How many days do you plan to stay for total trip? _____
10. What is your total travel time, with **your return included**:
    - From your home to your accommodation in Ethiopia _____days
    - From Your accommodation in Ethiopia to Semen Mountain National Park? _____days
11. Are you traveling with a group? 1. Yes ☐ 2. No ☐ if your answer is yes, how many people are in your group? _____ with whom did you come to the site? (Multiple answer is possible) 1. Friends ☐ 2. Wife ☐ 3. Families ☐ 4. Child ☐ 5. Others ☐ (please specify_____).
12. When did you arrive at the park this time? _____ (DD/MM/YY) in 1. EC ☐ 2. GC ☐

13. How long it takes to you to reach the park from your immediate temporary origin? _____in 1. Days ☐ 2. Hours ☐
14. How long will you stay on the park? _____days (from arrival to departure).
15. How long have you known about Semen Mountain National Park? _____years.
16. How many times do you visit the Semen Mountain National Park during the past one year? _____times.
17. Have you visited other recreation sites on your way to Semen Mountain National Park or do you plan to visit other recreation sites on your way back to home? 1. Yes ☐ 2. No ☐ If your answered yes, please specify the name of the site and their gate fees, the days stay and total cost while you visit:

No.	**Name of the site visited**	**Entrance Fee**	**Time spent at the site (days)**	**Total cost**	**Currency**
1	**Bahir Dar**(Tiss Abay Falls, Monasteries of Lake Tana etc)				
2	**Gondar** (Royal compound, Monasteries of Debre Birhan Selasie, Kuskuam complex, Flasha village)				
3	**Semen Mountain National Park**				
4	**Axum** (Stalea, Tsion Merry Church)				
5	Rock Hewn of Churches of **Lalibela**				
6	Addis Ababa				
7					
8					

18. How much did you spend for recreational activities or would you like to spend during your stay at the Semen Mountain National Park?

Activities	**Spend in currency: 1. USD ☐ 2. Euro ☐ 3. Birr ☐ 4. Pound ☐ 5. Other ☐ (please specify _____)**
Payment for guide	
Payment for scout	
Fee for photographic services	
Fee for renting camping equipment	
Fee for accommodation/hotel, including food and/or drinks expenditure at the site	
Fee for renting mules/horses and drovers	
Payment for campfire services	
Entrance Fee	
Staying Fee	
Souvenir	
Other expenses	

III. General Perception and Observation of Semen Mountain National Park

1. How would you describe your experience of the Semen Mountain National Park?
   1. Better than I expected ☐ 2. As I expected ☐ 3. Worse than I expected ☐
2. Rank problems related to Semen Mountain National Park in order of severity.
   1. Forest and landscape degradation of the area ☐
   2. Severe cold ☐
   3. Difficulty in walking on the very steep landscape areas ☐
   4. Lack of protected tourist zone ☐
   5. Lack of appropriate resting facility in the park ☐
   6. Difficulty to see the endemic wildlife animals due to insufficient number and inconvenient place ☐
3. Do you consider yourself as a person _____ about the environment or animal right? 1. Very concerned ☐ 2. Somewhat interested ☐ 3. Less interested ☐ 4. Indifferent ☐
4. Why did you choose to visit the Semen Mountain National Park? (Multiple answers are possible)

1. Mountain trekking & site seeing ☐ 4. Endemic animals & birds watching ☐
2. Naturally green landscape beauty ☐ 5. For research &/or course purpose ☐
3. To share experience with the society ☐ 6. Get away from cities & crowds ☐ 7. Others (please specify_____)

Interviewer: Now read the Choice Scenario to your respondents. Make sure that they pay attention of your description

IV. The Choice Experiment Scenario

In this experiment our aim is to give short description about the choice set that will be provided and to investigate visitor's choices for various measures affecting recreational quality of the park in terms of the wild life population, afforestation, and the different services. Here, we ask you to consider these factors and the costs for carrying out various measures in the choice questions that follow. But for the questions that follow, no 'wrong' or 'correct' answers are expected. What is required is the priority that you place for the different options provided and asked you to choose your preferred option. Please! Be careful in considering the attributes: ***ibex and*** **Wolf** ***population, afforestation and additional services***. Assume that the levels of these attributes are independent to each other. Please mark the preferred plan as if it is the only choice you make. And if you face any difficulty in understanding the options, don't hesitate to ask for further clarifications. In case you change your mind, feel free to go back and change your previous choice(s).

Suppose the government has an intention to take measures that could mitigate the problems of the park and reassure the development, conservation and sustainable use of the resources of the park. In order to accomplish this, there are fundamentally three areas where the government plans to improve the environmental quality of the park and its services.

1. **Ibex and Wolf population:** This program is designed in response to the decline in the endemic wild life species such as Walia ibex and Ethiopian Wolf. Thus, the plan is to improve the condition and to increase the number of endangered wildlife such as Walia Ibex and Ethiopian Wolf through establishing wildlife corridors, enlarging the core area, establishing buffer zone, reducing over grazing and the movement of other domestic animals like dog and local goats that threatened Wolf and Ibex respectively (that may results in loss of endemism through hybridization).

2. **Afforestation**: This is designed to solve the problem of decline in tree cover due to human pressure through cultivation and encroachment, overgrazing, and road construction. Thus this program involves new plantation of the degraded areas of the site and covering the surrounding degraded landscape with trees. This program helps to improve the park quality in terms of restoring the biotic contents (like different kind of endemic birds and wildlife) of the area, improve scenic view and encourage the non agricultural activities including ecotourism. Moreover, having variety of trees surrounding in and around the park increases the attractiveness of the area to visitors, restore the ecological functions of the park and hence other employment opportunities will be created.

3. **Additional services:** This plan is designed to solve the problem regarding the different services that are not sufficiently provided in and outside the park. The program helps to enhances and improves the condition, quality and quantity of different services by classifying as **to reach the site services** (like: information desk, improved infrastructure, and map), **on-site services** (such as: enough and trained Tour guides and guards, protected tourist zone, recreation benches, shops, showers, swimming pool and traditional transportations like renting mules, horses) and **after visiting the park services** (like: library/ museum and lodging facilities like providing tents, cabins, kitchen materials and construction of environmental friendly hotel and lodge services). Such actions are important for maintaining a good state of recreational experience.

However, it has to be known that the all these plans of the program require money for their implementation. To do these, the concerned authority will set appropriate mechanisms/strategy for implementation of the plans. And also the current level of entrance fee should be changed; that is visitors should be charged a higher level of gate fee than the current one. This payment will be collected and used to partially finance the costs of implementation of the proposed programs.

Assume the program will be implemented and thus money will be spent to improve and enhance the quality of the park in terms of increasing the number of Walia ibex and Ethiopian Wolf, afforestation of the degraded areas, and enhancing the existing services.

Interviewer: **Now show the Choice Set Cards and explain what they represent. Make sure that they pay attention of your description and help them in clarifying any doubt.**

Of the three plans below, which one of the following Plans do you prefer for each choice set?

Choice Set 1

Attributes	Plan 1	Plan 2	Plan 3 (Status quo)
Ibex and Wolf Population	150% increase in their number	50% increase in their number	No change (Currently 750 Ibex and 200 Wolf)
Afforestation	Planting 2,000,000 new trees	Planting 2,000, 000 new trees	No new plantation of trees
Additional services	Provision of on-site and after visiting the park service[3]	Provision of after visiting the park service[2]	No improvement
Entrance Fee	50% increase	150% increase	No change
Choose one by putting a tick mark (√)			

[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 additional lodges, hotels and camping equipment** respectively.

Choice Set 2

Attributes	Plan 1	Plan 2	Plan 3 (Status quo)
Ibex and Wolf Population	50% increase in their number	150% increase in their number	No change (Currently 750 Ibex and 200 Wolf)
Afforestation	Planting 2,000,000 new trees	Planting 1,000, 000 new trees	No new plantation of trees
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 improvement
Entrance Fee	50% increase	100% increase	No change
Choose one by putting a tick mark (√)			

Choice Set 3

Attributes	Plan 1	Plan 2	Plan 3 (Status quo)
Ibex and Wolf Population	50% increase in their number	150% increase in their number	No change (Currently 750 Ibex and 200 Wolf)
Afforestation	Planting 3,000,000 new trees	Planting 2,000, 000 new trees	No new plantation of trees
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 improvement
Entrance Fee	100% increase	100% increase	No change
Choose one by putting a tick mark(√)			

Choice Set 4

Attributes	Plan 1	Plan 2	Plan 3 (Status quo)
Ibex and Wolf Population	100% increase in their number	100% increase in their number	No change (Currently 750 Ibex and 200 Wolf)
Afforestation	Planting 3,000,000 new trees	Planting 1,000, 000 new trees	No new plantation of trees
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 improvement
Entrance Fee	100% increase	50% increase	No change
Choose one by putting a tick mark (√)			

Choice Set 5

Attributes	Plan 1	Plan 2	Plan 3 (Status quo)
Ibex and Wolf Population	100% increase in their number	100% increase in their number	No change (Currently 750 Ibex and 200 Wolf)
Afforestation	Planting 1,000,000 new trees	Planting 3,000, 000 new trees	No new plantation of trees
Additional services	Provision of after visiting the park service[2]	Provision of on-site and after visiting the park service[3]	No improvement
Entrance Fee	150% increase	50% increase	No change
Choose one by putting a tick mark (√)			

V. Follow up questions

Which one of the following statements best describes the reason for your choices of the plans?

1. The proposed measures were good but I didn't have the ability to pay and thus I chose the status quo.
2. I chose the status quo option because of an objection to the amount of entrance fee.
3. I exclusively chose the cheapest plan whatever its levels.
4. I found that the increase in endemic Walia ibex and Ethiopian wolf population attribute is important and thus gave a priority for choice the highest level of this attribute.
5. I found that afforestation attribute is important and thus gave a priority for choice the highest level of this attribute.
6. I found that improving the additional services attribute is important and thus gave a priority for choice the better of this attribute.

APPENDIX B

Exchange Rate in 1 Ethiopian Birr

Currency	1 Birr
USD	16.5
British Pound	26.5
Euro	22.5
Canadian Dollar	16.75
South African Rand	2.5

Source: CBE