ADDIS ABABA UNIVERSITY

SCHOOL OF GRADUATE STUDIES

ECONOMIC VALUATION OF NECHISAR NATIONAL PARK ECOSYSYTEM: CHOICE EXPERIMENT APPROACH

BY

ADUGNA ETICHA

June, 2016

Addis Ababa, Ethiopia

ECONOMIC VALUATION OF NECHISAR NATIONAL PARK ECOSYSYTEM: CHOICE EXPERIMENT APPROACH

By: Adugna Eticha

A Thesis Submitted to

The Department of Economics

Presented in Partial Fulfillment of the Requirement for the Degree of Masters of Science in Economics (Natural Resource and Environmental Economics)

Addis Ababa University

Addis Ababa, Ethiopia

June, 2016

Addis Ababa University

School Of Graduate Studies

This is to certify that the thesis prepared by Adugna Eticha, entitled: Economic Valuation Of Nechisar National Park Ecosystem: Choice Experiment Approach in Partial Fulfillment of the Requirement for the Degree of Masters of Science in Economics **(**Natural Resource and Environmental Economics**)** is in line with regulations of the university and meets the accepted standards with respect to originality and quality.

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Abstract

Economic Valuation of Nechisar National Park Ecosystem: Choice Experiment Approach

Adugna Eticha

Addis Ababa University, 2016

Nechisar National Park is one of the known tourist attraction sites in Ethiopia due to its scenic land features, richness in diversified fauna and flora with some endemic mammals and birds. It was established in 1974 in the Southern Nation Nationality and Peoples of Ethiopia that is located 500kms from Addis Ababa, near Arba Minch town. But this rich ecosystem is endangered due to human encroachment. This is a result of a rapid expansion of Arba Minch town, the formation of state farms which latter privatized, establishment of various institutions, immigrants from the Gamo highlands and residents of Arba Minch town demanding forest production, illegal hunting and using the park for grazing by nearby communities. If the current conditions continue in such way the local community would lose any benefit that they may get from the ecosystem service of the park and the influx of tourists from various corners of the world. Hence, valuation is demanded to influence introduction of eco-tourism service by the stakeholders.

To know the monetary value of Nechisar National Park, Choice experiment technique was applied using primary data collected by intercepting 210 visitors. Of these, 120 were domestic and 90 foreign visitors. Choice experimental model used to elicit tourists' preferences for improvements of the park's ecosystem through willingness to pay for attributes such as afforestation, wildlife population and additional services using entrance fee as a vehicle of payment. Multinomial and Random parameter logit model were used for the estimation. The marginal WTP calculated from RPL model for each attribute were approximately 5.2, 8.79, 11.2 in birr for domestic visitors and 7.7, 8.11, 35.87 in birr for foreign visitors per visit per individual respectively for afforestation, wildlife population and additional services. Hence, tourists' order of preference was additional services, wildlife population and afforestation for both local and foreign tourists. In the meantime, compensating surplus for three improvement scenarios (low, medium and high) were estimated. Hence, the total economic value of the park in terms of welfare estimation from high impact scenario was summed up to be 749,107,667 birr (US $ 35,876,804).

Acknowledgements

My utmost appreciation goes to my thesis supervisor Dr. Tekie Alemu for his constructive advice, comments and encouragement which directed me in all stages of the study. THANK YOU Dr! being he was beside me during various ups and downs of my research work. His excellent quality as a person and best as academician has taught me a lot in the course of the real life. I would like to extend my foremost gratitude to Addis Ababa University for their partial support of my thesis work. My thanks also belong to Dr.Sahan Dissanayake professor at Portland State University who worked choice experimental design. My special thanks must also go to Dr. Alemu Mokonnen for his constructive and smart comments on choice experiment approach.

Next I would like to extend my special gratefulness to Dr. Dawit Wubeshet, researcher at Environmental and Climate Research Center (ECRC), Dr. Zelalem Gutu, Mr. Mokonnen Bersisa (PHD candidate), Mr. Gebretsadik Teshager, Mr. Abrha Teklay and all my friends whom their names were not mentioned here for their helps during the research period.

Finally, I would like to thank all my family members, especially my uncle Mr. Yehualashet Seyoum for his deep concern, and the data enumerators, and different staffs of Nechisar National Park.

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Acronyms

ASC	Alternatives Specific Constant
CE	Choice Experiment
CEM	Choice Experimental Method
CLM	Conditional Logit Model
CS	Consumer Surplus
CVM	Contingent Valuation Method
DCE	Discrete Choice Experiment
DCVM	Dichotomous Contingent Valuation method
ECRC	Environment and Climate Research Center
EWCA	Ethiopian Wildlife Conservation Authority
EWCO	Ethiopian Wildlife Conservation Organization
HPM	Hedonic Pricing Method
IIA	Independent of Irrelevant Alternatives
IID	Independently and Identically Distributed
LRI	Log-likelihood Index
MASL	Meters above sea level
MNL	Multinomial Logit Model
MWTP	Marginal Willingness to Pay
NNP	Nechisar National Park
PWES	Payment for Water Ecosystem Services
RPL	Random Parameter Logit Model
SDPASE	Sustainable Development of Protected Areas System in Ethiopia
SNNPS	Southern Nation, Nationalities and Peoples' Regional State
TCM	Travel Cost Method

TWP	Total Willingness to Pay
UNESCO	United Nations Educational, Scientific and Cultural Organization
US	United State
USD	United State Dollar
WTP	Willingness to Pay

CHAPTER ONE

INTRODUCTION

1.1.Background of the Study

Nechisar National Park (NNP) is one of the well-known parks in Ethiopia. It is located in the Southern Nations, Nationalities, and Peoples Region (SNNPR) to the East of Arba Minch, the administrative center of Gamo Gofa zone, about 500 kms from Addis Ababa. The park was established in 1974 in the scenic part of the Rift Valley floor between two lakes. It covers 514 km^2 of which 78 km^2 is covered with water bodies at elevations ranging between 1108 and 1650 meters above sea level. It is "a mosaic of forest, bush land, grassland and fresh water habitat" (Duckworth et al. 1992). Nechisar is named after the creamy white grass that covers the park in the central plain area of the park.

In spite of the fact that it has been enjoying a national park status since the establishment time, it has not been legally gazetted. It is not a much developed national park, but yet hosts national and international tourists of various sorts. From the early accounts of biologists who surveyed the area to the present, the necessity of nature conservation in this park has been more geared towards developing it for tourism. In fact, NNP has immense potential to be a great tourist destination. It has various wildlife species including endemic mammals and birds. The various types of vegetation such as riverine forest, savanna grassland, bush land along the strip of the land that separates the two Lakes Abaya and Chamo. Moreover, the hot springs and forty springs found in the Eastern part of the park and the "crocodile market" located on the North Western shores of Lake Chamo add to the scenic beauty of the area. In addition to all these

tourist attractions the proximity of the park to the town of Arba Minch makes service delivery to tourists easier (Abiot, 2009).

The Park's area was unpopulated for long years. Since establishment the negligible management services have been provided until the last twenty years when Ethiopia's population exploded, propelling new communities to settle within Nechisar National Park (NNP). The consequent of deforestation, grazing cattle, human habitation and overfishing in the park have caused severe stresses and degradation of park ecosystems, leaving the sustainability of Nechisar National Park's resources in question. As the population around Nechisar National Park and nearby Arba Minch town increases, so did the pressures to grazing cattle, fishing and collecting wood in the park (Jones, 2005). The high population in need of resources on one hand, and a rich natural ecosystem on the other hand, calls for extensive research of specific sites i.e. measuring the money metric of the natural ecosystem of the parks to find what the best use of resources is, for instance, if the area should be kept for conservation and/ or recreational purpose or if the resources of the site shall be diverted into other non-conservation uses. However, it is important to notice that some of these decisions are irreversible, once natural resources has been distracted, scenery provided by the nature might not be restorable and the species previously living on the site's might be extinct. Hence, there will be no ways in which species come to exist once again (Sebastian and Tobias, 2007).

The services Nechisar National Park and its ecosystem provide can be seen as environmental goods. Environmental goods are often not priced on the market and by being not priced its importance may be valued lower than its true value and this could lead to improper use of resource, thus valuation of the park is important to assign proper monetary value. To assign quantitative value of environmental goods the valuation techniques natural resource and

environmental economists use are categorized into two measure categories: revealed preference methods and stated preference methods. The revealed preference method helps to measure the value of non-market good through actual (revealed) behavior of the consumers of the environmental goods. The two well-known revealed preference methods are the hedonic pricing method and the travel cost method (TCM). Likewise, stated preference methods assess the value of non-market goods by using individuals' stated behavior in a hypothetical setting. The major known techniques under this valuation method are contingent valuation (CV), choice experiment (CE) and conjoint analysis.

The study on the Nechisar National Park site seeks to give an insight on stated recreational value of consumers. The consumers in this case are the individuals seeking to recreate themselves in nature entitled and scenic land view supported by dense forest and the two lakes, Abaya and Chamo, observed in spectacular view on the East verge of Arba Minch town or those of individuals recreating themselves by visiting different biodiversity, water bodies and facilities in the park. The primary objective of the study is to conduct choice experimental survey using questionnaire to quantify monetary use and non-use value for the park and determine the visitors' preference of different attributes and estimate the welfare impacts of improvement of each attributes of the ecosystem.

1.2.Statement of the Problem

Many natural resource systems such as lakes, rivers, streams, estuaries, forests and national parks are used extensively by people for various types of recreational activities. Natural resource systems provide valuable services to people. From an economic perspective, these services have two important features. First, the economic value of these services depends upon the characteristics of the natural resource system. Knowledge of the value of these services is

therefore important for a variety of resources management decisions. Second, access to the resource for recreation is typically not allocated through markets. Rather, access is typically open to all visitors at a zero price or a nominal entrance fee that bears no relationship to the cost of providing access to, or consumer valuation of, the resources. Moreover, there is little or no variation in these access prices over time, or across sites, in order to enable an econometric estimation of demand functions (Freeman, 1993).

Like other environmental resources and public goods, all protected areas of Ethiopia in general and national parks in particular have immense benefit to the sustainable development of the economy and play a significant role in the fight against poverty. Indirect benefits, such as water provision for domestic consumption and irrigated agriculture, electricity production, carbon sequestration and the conservation of biodiversity far exceeds the direct benefits derived by local communities and direct users fee in protected areas (e.g. from tourism) (SDPASE, 2009). Similarly, Nechisar National Park is in a position to provide all these environmental services as it is a home for various types of biodiversity. However, it is threatened by various activities like cattle grazing, increasing demand for fuel wood, fishing, hunting and human settlement in the park. If these scenarios continue the local community would lose any benefit that they might obtain from the park's resources and the associated wild life would be in danger. The direct results of all these anthropogenic activities harmed the ecosystem of the park through serious environmental degradation.

The phenomenon of environmental degradation, especially that of deforestation was stronger on Arba Minch ground forest from where forty springs discharge. Forty springs are major tributaries of Lake Chamo and the source of Arba Minch town water supply. Following the destruction of this forest the water flow variability occurred. Furthermore, wild life and other downstream

resources like crocodiles, hippopotamus and fishery resources in the lake have been affected. With this fast rate of environmental degradation, the ecosystem has approached to the point where it can't support the community and the wildlife; hence, Arba Minch town dwellers and surrounding communities have been challenged by some serious problems in their livelihood (Abiot , 2009; Aramde , 2011; Zewdu, and Yemesrach, 2004). Severity of these problems has further exacerbated with insufficient funding to employ enough human power that minimizes the mismanagement of the park's ecosystem.

To minimize these financial problems which are tool for tackling the above mentioned problems to some extent, the park should be financed internally, but own fund of the protected areas in Ethiopia is difficult. In case of the protected areas in Ethiopia, two sources of funds are available for parks management: external sources (for example from NGOs, government and donors' budgets) and revenues generated from within protected areas (parks) (for example payments for environmental services or park entry fees. As it is obviously known, Ethiopia is one of the low income trapped country that the government budget allocation was limited and donation by private entities were feature of funding as it is usual elsewhere worldwide. The other alternative would be to generate more revenues for park management through user fees of environmental services (entrance fees). At present time, there is low entry fee for accessing national parks. Therefore, entry fee to these parks has been insufficient for the proper upkeep of these parks (SDPASE, 2009). Similarly, NNP is the case in point that revenues from entry fee and other sources of income internal to the park have insignificant impact in conservation of the park's ecosystem on a sustainable base.

To achieve sustainable financing basis of the park, it is important to quantify the economic value of the park and identify the tourists' preferences using the multi attributes technique or

econometric model of choice experiment by setting hypothetical scenarios of the park's ecosystem. Thus, an integrated forest and wildlife management with the involvement of all stakeholders may be used as a strategy to conserve the forest and associated resources.

Though valuation of NNP ecosystem was conducted previously by Zewdu and Assefa in (2004) the contribution of this study will be still unique and very important because it will make a difference in many aspects. These researchers made contingent valuation method (CVM) analysis by surveying households' willingness to pay for endangered ecosystem of NNP using questioners while this study made analysis using Choice experiment method using questionnaires on both local and international visitors of the park. Hence, value elicitation of this method is stronger than CVM by overcoming some limitations of CVM. Besides, it will be expected to fill the gap on the existing limited literature in the country's park ecosystem area in general and methodological application of the multi-attributes valuation based methods in particular. Until now, Mesfin, (2010) and Ali, (2011) were the only two individuals who practiced valuation of natural resources' ecosystem by using CE technique, on wetland ecosystem of Wondo Genet and ecotourism area of semen mountain national park respectively. In similar way choice experimental technique was used in monetizing the recreational value of the NNP and the multi-preferences of the visitors using the following questions:

i. Which attributes are responsible in influencing the willingness to pay of visitors of Nechisar National Park?

ii. What are the visitors' marginal willingness to pay and welfare impacts of improvement of different attributes of the ecosystem of the park?

iii. What is the estimated amount of consumer surplus and recreational benefits of Nechisar National Park?

iv. What are the alternative policy implications that should be in place to properly manage natural resources in the park?

1.3. Objectives of the Study

The general objective of the study is estimation of the recreational benefit of the Park and determines the visitors' preferences for different attributes using Choice Experiment Method. Specifically the objectives of the study are the following:

i. Identifying the major attributes that are responsible in influencing the visitors' willingness to pay for the recreational services of Nechisar National Park (NNP).

ii. Estimating the visitors' marginal willingness to pay and welfare impacts of improvements of each attribute of the recreation site.

iii. Estimate the consumer surplus and recreational benefits of Nechisar National Park

iv. To suggest alternative policy implications and recommendations.

1.4 Scope of the Study

The study applied stated preference valuation method in non-marketed environmental resource, Nechisar National Park. Specifically Choice Experiment Method was used in identifying the visitors' preferences of different attributes of Nechisar National Park's ecosystem area. During the survey period only those individuals who entered the park by paying entrance fee via the gate were considered for the questionnaire. Those who entered the park through the dense forest of

Nechisar National Park illegally by escaping from rangers and scouts of the park were excluded because the park was unfenced and vulnerable for the free rider visitors.

1.5 Significance of the Study

The result of this paper will be relevant in many ways, thus it will give some supportive ideas in:

- Setting environmental standards and efficient management of resources that will be supplemented by economic valuation;
- Providing how quantitative estimates can be made on the economic benefits and preferences of attributes of the recreation site, this research work will contribute to the limited empirical literature in natural resources valuation in Ethiopia in general and will serve as empirical reference on the limited application of choice experiment in park ecosystem areas in particular.

1.6 Limitation Of The Study

In choice experimental modeling, extended forms of the Multinomial and Random parameter logit model were not estimated due to hessian singularity by interacting socio-economic variables with Alternative specific constant and the attributes. Therefore, observed heterogeneity was left undetected. On the other hand, purposive sampling technique which makes sample less representative compared with probabilistic sampling was used, because it was costly both in time and finance to collect data using probabilistic sampling technique as it takes a year to make potential tourists equal chance of being interviewed

1.7 Organization Of The Paper

The remaining part of this thesis were organized as follow: Chapter two of the paper discusses the theoretical background of the economics of valuing ecosystem services, biodiversity and techniques of valuation of environmental resources followed by empirical review of past works on Choice Experimental modeling. In Chapter three, methodological framework of choice experiment, sampling technique, sample size determination, experimental design issues, data collection techniques and the type of data collected for conducting the survey were explained. The statistical description and the Econometric results of Choice Experiment were analyzed in chapter four. Finally, the conclusion of main findings and policy recommendations were made in chapter five.

CHAPTER TWO

RELATED LITERATURE REVIEW

In this section both theoretical and empirical issues in the area of estimating non-marketed environmental benefit of both use and non-use values will be discussed.

2.1.Theoretical Literature Review

2.1.1. The Economics of Valuing Ecosystem Services and Biodiversity

Economics, as a social science helps to allocate limited resources, uses valuation to provide society information regarding the relative extent to which the resources are scarce and efficient method of utilizing these scarce resources. The value of ecosystem services and biodiversity implies what we, as part of the community, are willing to exchange to conserve these environmental resources. Economic valuation of ecosystem services and biodiversity helps the whole society in general and policy makers in particular, that biodiversity and ecosystem services are naturally scarce and their diminishing conditions results in costs to society. If this condition takes place continuously, then any environmental policy would be misguided and society would face misallocation of resources (Pascual et al., (2010).

Economically, an asset is scarce if its use carries opportunity costs. It means, to get one additional unit of the good under consideration one must give up a certain amount of something else. In economic principle, monetizing and valuing ecosystem services are not different from monetizing and valuing goods and services which are marketable. However, valuing ecosystem services is difficult. Valuation of resource is reasonable in case where there exist well-developed market, but it is unlikely to get well developed market structure for some non-marketed cultural and regulating services (Carpenter, 2006 and Barbier et al., (2009). The problem is that the

publicness nature of most of ecosystem services results in over exploitation of ecosystem areas (Pascual et al., 2010)

Elements of ecosystem as part of natural capital, and the flow of ecosystem services is the "interest" on the capital that society obtains (Costanza and Daly (1992). In addition to this, (Perrings et al., (2006) suggested that human beings need to choose a level of biodiversity and natural capitals that maintains future flows of ecosystem services to ensure environmental quality and human well-being to eradicate poverty (Pascual et al., 2010).

Thus, valuation plays critical role in creating markets for the preservation of ecosystem services and biodiversity, for example, through payments for ecosystem services as mentioned by Engel et al., (2008) and Pascual et al., (2010). According to Kontoleon and Pascual, (2007), such market creation process needs three important stages: demonstration of values, appropriation of values and sharing benefit from preservation. Demonstration is identification and measurement of the flow of ecosystem services and their values. Appropriation is capturing some or all of demonstrated and measured values of ecosystem to provide incentives for their sustainable provision. Appropriation internalizes, through market system, demonstrated values of ecosystem services so that those values affect biodiversity resource use decision. Internalization is achieved by correcting markets. In the benefit sharing part, appropriation must be designed that capture ecosystem services benefits are distributed among those who bear the cost preservation areas (Pascual et al., 2010)

2.1.2. Components of Value of Environmental Resources

Economists classified the total economic value conferred by resources into three main categories: use value, option value and non-use value.

Use value: use value implies the direct use of environmental resources. Fish harvested from the sea, timber harvested from the forest, water extracted from the extreme for irrigation purpose and the scenic beauty provide by natural environmental views are examples of use values of resources. When uses of environmental resources are experienced by using one of our sense organs-sight, sounds, touch, taste or smell, then we have used the resources. Some of these uses are called passive use value non-consumptive use values if the resource is actually used up in the process of experiencing it.

Option value shows the value people place on a future ability to use the environmental resources. Option value reflects the willingness to pay to preserve the option to use the environmental resources at sometimes in the future. Use value reflects the value of obtained from current use whereas option value reflects the need to conserve the potential for possible in the future.

Non-use value reflects the common observation that people are willing to pay for improving environmental resources that they will never use. Bequest value is one of elements of non-use values. Bequest is the willingness to pay of current generation to ensure resources availability for their children and grandchildren. A second type of non-use value, a pure non-use value, is called existence value. Existence value is measured by willingness to pay to ensure that a resource continue to exist in the absence of any interest in future use. The term existence value was first coined by economist John Krutilla.

These components of value can be combined to produce the total willingness to pay (TWP):

TWP=Use Value + Option Value + Nonuse Value

Thus, calculation of total economic value of environmental resources should include all the above categories of values. But, nonuse values are derived from motivations other than personal use, hence they are obviously less tangible than use values. Therefore, total willingness to pay estimated without nonuse values, however, will be less than the minimum amount that would be required to compensate individuals if they are deprived of this environmental asset. Hence, ignoring some of non-use values while conducting valuation of total economic value of environmental resources results in misallocation of resources (Tietenberg and Lewis, 2011).

In case of Nechisar National Park, use values could be the shelter that it gives for all fauna and flora in the park, and the recreation experience gained by the visitors. 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 conserving biodiversity inside the park.

2.1.3. Environmental Valuation Techniques

In order to provide information to planners and decision makers and then for managing the natural ecosystem appropriately, their total economic value should be determined and expressed in monetary forms. Hence , environmental managers can use the determined monetary values that help them for decision making process. Different non-market valuation methods have been developed by environmental economists to perform such activities. Thus, there are two broad classifications of non-market valuation techniques namely revealed and stated preferences techniques that will be discussed in the following section:

2.1.3.1.Revealed Preference Methods

Revealed preference methods are "observable" because they involve actual behavior and "indirect" because they infer a value rather than estimate it directly or revealed preferences are widely applied in situations where certain actions or preferences from individuals provide information good enough to be used to value other goods or services. Among the revealed preference methods travel cost and hedonic pricing methods are frequently used for elicitation of willingness to pay of consumers for non-marketed goods and services from related goods and services Nde, (2011) and Pascual et al., (2010). In subsequent sections we will have a wide discussion cover on these major revealed preference valuation techniques:

Hedonic Pricing Method (HP)

The hedonic pricing approach follows Lancaster's theory of characteristic of a good, which takes a good (a service) as a bundles of attributes and hence, the value of a good as a function of each attribute of that good (Lancaster, 1996). As expressed in Hidona, (2002) and Kjaer, (2005) the value of an attribute is the indirect price (hedonic price) as it cannot observed in the real market. However, the implicit price of the attribute can be estimated through analysis of the prices of a good that has different quantities of each attribute in the market. Thus, hedonic pricing is a technique of estimating the implicit (indirect) price that those within the market place on each attribute. The function used to determine the market price of a good based on the characteristics of the good is hedonic price function (Stephens, 2010).

For instance, it may be possible to estimate the value of differing levels of noise pollution by examining how house prices vary with proximity to airports once all other aspects that may influence house prices have also been taken into consideration. The main disadvantage with technique is multi collinearity between prices and explanatory variables for example poorer

quality houses tend to be built in areas subjects to noise pollution, along rail lines, etc. finally, the main prerequisite for such analysis is to have a functioning market in which it is believed that prices are truly set by the market mechanism.

Travel Cost Method (TCM)

Travel cost method (TCM) was the earliest non-market valuation technique applied by environmental economist. It has been used to value non-marketed natural resources like national parks, natural reserves and sanctuaries, and open space that serves as the factors that produces outdoor recreation activities and related environmental amenities: hiking, camping, fishing, boating, swimming, wild life watching and the like (Schechter, 1999). It takes the value the site, or recreational services, as a function of people's willingness to pay to get the site. It uses actual behavior to deduce values. The travel cost method can be used to calculate economic benefits or costs generated by changes in access costs for recreational sites, elimination of existing recreational sites, addition of new recreational sites, or change of environmental quality at recreational sites, this method is demand-based approach which expresses the relationship between visitation rates and price paid to visit particular recreational site. The basic foundation of the travel cost method is time and travel expenses incurred by visitors of the site are used as proxy for "price" of accessing the site. Visitors' willingness to pay (WTP) to visit the natural ecosystem and biodiversity preserved in protected areas can be estimated using the number of trips made at different travel costs, which is analogous to estimating their WTP marketed goods based on the quantity demanded at varies prices (Gyeedu, (2011).

Travel cost method is first originated by Harold Hotelling in 1947 by writing a letter to US National Park Service suggesting that travel time and other recreational expenses during visitation of public sites could be used as proxy for the value of the sites. The main purpose of

this letter was to show that the benefits obtained from the park exceeded the cost of visitors (Farrow, 2000). Later Clawson (1959) explicated this concept in more detail, which brought TCM in economic literature formally (Mathis, 2003). This approach was known as Clawson-Knetsch travel-cost model, used to estimate the consumers' willingness to pay for non-marketed outdoor recreations. After decades, this method has been developed to estimate the value of recreational sites and ecosystem areas Gyeedu, (2011).

2.1.3.2.Stated Preference Methods (SPM)

Stated preference approaches simulate a market and demand for ecosystem services by means of surveys on hypothetical (policy-induced) changes in the provision of ecosystem services . Stated preference methods can be used to estimate both use and non-use values of ecosystems and/or when no surrogate market exists from which the value of ecosystems can be deduced. The main types of stated preference techniques are contingent valuation and choice experiment methods Pascual et al., (2010). In the subsequent section these two known techniques will be discussed:

Contingent Valuation Method (CVM)

Contingent valuation method (CVM) is the oldest method of the stated preference method of non-marketed valuation approach. It is a direct non-market valuation method in which respondents of the relevant population are asked questions about their WTP or WTA for use or conservation of ecosystem goods and services. It is called 'contingent valuation' because the valuation is contingent on hypothetical market given for the respondents during the survey process. The main advantage of the survey technique is to give inputs to analyses of changes in the level of improvements of ecosystem goods and services, and that most of the ecosystem goods and services have the characteristics of non-excludability and non-divisibility. CVM has

two advantages over indirect methods. First, it helps to estimate both use and non-use value of ecosystem's goods and services. Second, unlike the indirect methods, CVM answers to WTP or WTA questions is directly go correctly with theoretical monetary measures of utility changes(Parmen et al 2011). As it is mentioned in Pascual et al., (2010), on the other hand, CVM is suffering from many problems. There are five types of major potential bias in CVM practices:

- **Strategic bias** it occurs when the respondents give bias answer in order to influence a particular outcome.
- **Information bias** it may arise when the respondents are forced to value attributes with which they have little or no experience
- **Starting point bias** may occur in those survey instruments that a respondent is asked to check off his/her answers from predefined ranges of possibilities. How range is defined by the designer of the survey may affect the resulting answers. For instance, a range of $0-$100 may produce a valuation by respondents different from a range of $10-$100, even if no bids are in the areas $0-$10 range.
- **Hypothetical bias** can enter the picture because the respondent is being confronted by a contrived, rather than an actual, set of choices. Since he or she will not actually have to pay the estimated value, the respondent may treat the survey casually, providing ill-considered answers. And,
- The observed discrepancy between willingness to pay (WTP) and willingness to accept (WTA).

Note that CVM can be used for both use and non-use values, but its actual use has mainly been in regard to non-use values of resources. Especially, most of CVM applications have concerned

existence values. Given this scenarios, and indirect techniques cannot elicit existence values, economists deals CVM to ascertain these values (Parmen et al., 2011).

Choice Experiment Method (CEM)

Choice experiment modeling was first used by Louviere and Woodworth in 1983. It is a valuation method which has a wide range of application that is from marketing, health and environmental management to transportation and infrastructure services Kragt and Bennett, (2008). As mentioned in Hanely et al (1998) CE was first applied in environmental management problems by Adamowicz et al (1994), although many application in other fields (notably in marketing and transport economics precede this. It is an increasingly popular approach to estimate the value of non-market goods and services, and advocated as a flexible and cost-effective technique to determine the cost and benefits of public projects Louviere et al., 2000, Alpizar et al., (2001), Bennett and Blamey, (2001). In a CE, respondents are given a series of choice sets, where the choices show the outcome of the alternative (hypothetical) policy scenarios. The outcomes are described by different levels of attributes used to express the good that is being under valuation. In selecting between alternative options, individuals are expected to make a trade-off between the levels of the attributes. This helps to identify the relative importance of attributes. By introducing the monetary attribute in choice sets, it is possible to calculate the individual's marginal willingness to pay (MWTP) or implicit price for a change in each of the other non-market attributes (Kragt and Bennett, 2008).

Stages in Choice Experiment Exercise

Any choice modeling exercise requires the following basic steps.

Stages	Description
Selection of attributes	Identification of relevant attributes of the good to be valued. Literature reviews and focus groups are used to select attributes that are relevant to people while expert consultations help to identify the attributes that will be impacted by the policy. Monetary cost is typically one of the attributes to allow the estimation of WTP.
Assignment of levels	The attribute level should be feasible, realistic, non-linearly spaced, and span the range of respondents' preference maps. Focus groups, pilot survey, literature reviews and consultations with experts are instrumental in selecting appropriate attribute levels. A base line 'status quo' level is usually included.
Choice of experimental design	Statistical design theory is used to combine the levels of the attributes into a number of alternative scenarios or profiles to be presented to respondents. Complete factorial designs allow the estimation of the full effects of the attributes upon choices: that includes the effects of each of the individual attributes presented (main effects) and the extent to which behavior is connected with variations in the combination of different attributes offered (interactions). These designs often originate an impractically large number of combinations to be evaluated. For example 27 options would be generated by a full factorial design of 3 attributes with 3 levels each. Fractional factorial designs are able to reduce the number of scenario combinations presented with a concomitant loss in estimating power (i.e. some or all of the interactions will not be detected). For example, the 27 options can be reduced to 9 using a fractional factorial. These designs are available through specialized software.

Construction of the choice sets	The profiles identified by the experimental design are then grouped in to choice sets to be presented to respondents. Profiles can be presented individually, in pair or in groups. For example, the 9 options identified by the fractional factorial design can be grouped into 3 sets of four- way comparisons.
Measurement of preferences	Choice of a survey procedure to measure individual preferences: ratings, rankings or choices.
Estimation procedures	OLS regression or maximum likelihood estimation procedures (logit, probit, ordered logit, conditional logit, nested logit, panel data models etc). Variables that do not vary across alternatives have to be interacted with choice specific attributes.

Source: Hanley et al., 2001

Comparison of CEM and CVM

Relative to CVM, the CE method would seem to have several advantages.

These are:

- It is easier to estimate the value of individual attributes that make up ecosystem and biodiversity of the protected areas, such as endemic plants and animals. This is important since many management decisions are concerned with changing attribute levels, rather than losing or gaining the ecosystems contain as a whole.
- 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 may offer advantages over CVM in terms of benefits transfer, if environmental goods can indeed be decomposed into measurable attributes with money values which can be estimated; and if socioeconomic variable are included in the CE models used.

- CE also avoids the "yea-saying" problem of dichotomous CVM design, since respondents are not faced with stark "all or nothing" choice in that design of CVM. They may choose one of two environmental alternatives, or the status quo, in each choice pair, of which they receive many. Thus, there are repeated opportunities for them to express their environmental preferences within CE design.
- Adamowicz (1995) and Adamowicz et al. (1998b) have speculated that CE may be a good way around the embedding problem encountered in CVM since tests of scope are essentially built in to the CE.
- The repeated sampling approach of CE allows for internal consistency tests in the sense that models can be fitted on sub-sets of the data (Hanely et al 1998).

None of the non-marketed goods' valuation methods are free from problems. Likewise, as it has strong side, CE method has also weak side. The principal problem of CE compared to CVM is that, it has often a complex nature of statistical/experimental design; and the selection of appropriate attributes and levels (Hanely et al 1998).

2.2.Empirical Literature review

Mesfin (2010) applied choice experimental and travel cost modeling in valuation of Wondogenet wetland recreational area. Wondogenet wetland recreational area is one of the well-known and naturally endowed tourist destination site found in southern nation, nationalities and peoples of Ethiopia. In estimating the monetary value of the wetland four attributes such as afforestation, general services, quality of the recreational quality and entrance fee i.e., cost attribute were selected. Multinomial logit model and random parametric models were applied in choice experimental using data collected from 192 samples of both domestic and foreign visitors. The results of both multinomial logit and random parametric models estimation show that all

attributes are significant and same signs as expected. The marginal willingness to pay (MWTP) of the visitors were calculated right after the estimation of RPM and MWTP of the attributes were birr 0.985, birr 2.93, and birr 7 respectively for afforestation, general services and recreational quality. Furthermore, the estimated compensated surplus of the respondents were birr 22, birr 37 and birr 44 for low impact improvement scenarios, medium impact improvement scenarios and high impact scenarios respectively.

Girma (2006) applied choice experimental technique in valuation of improved quality of Lake Hawas in southern Nations, Nationalities and peoples Region of Ethiopia. Girma identified three attributes in the area. The identified attributes in this research area were forest coverage, Tilapia fish stock and permit level of fishing which is cost attribute. In this research program, three management scenarios of the lake were implemented in valuing the quality of the lake. Data was collected from randomly selected 200 fishermen and analyzed using multinomial logit model. The respondents were asked to choice their best alternatives of six choice sets provided to them. The result of the model proved as the fishermen's maximum willingness to pay was for Tilapia fish stock. The implicit price of fishermen for the improvement of Tilapia fish stock was estimated to be birr 8.33 per month. Compared with the Tilapia fish stock the respondent's willingness to pay for forest cover was low i.e., birr 0.56 per month. The compensated surplus for low impact scenarios, medium impact scenarios and high impact scenarios were estimated to be 18.62 birr, 28.62 and 31.42 per month respectively.

Robert and Zenia (2001) applied choice experiments approach as instrument to examine the preferences of domestic and foreign tourists in relation to the development of Barva Volcano Area in Costa Rica. 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 revealed that the preferences for national and foreign tourists were 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.

The calculated marginal willingness-to-pay for greater information, best view and use restriction were 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.

Ali (2012) applied travel cost modeling and choice experiment model in valuation of Simen Mountain National Park in Northern part of Ethiopia. Simen Mountain National park is one the known tourist destination in Ethiopia due to its endemic mammals and spectacular land feature. It was also listed as one of the UNESCO world heritage site since 1978. Ali collected data from the total sample of 200 visitors and fitted the data to the basic and extended MNL model and RPL model for both local and foreign tourists.

The difference of MNL and RPL model result for both foreign and domestic visitors were small in terms of magnitude and sign. All attributes were significant in RPL as in MNL model. But the pseudo R^2 in RPL was better than MNL for both foreign and domestic visitors.

Marginal willingness to pays (MWTPs) were calculated from the coefficients of RPL model. MWTP for all attributes were significant. MWTP for foreign tourist were 42.5 birr, 0.000026 birr and 15.9 birr per day for Walia ibex and Ethiopian wolf population, afforestation and additional services respectively whereas MWTP for the identified attributes were 12.05 birr, 0.0000062 birr and 2.76 birr per day for the improved level of Walia ibex and Ethiopian Wolf population, afforestation and additional services respectively. The implication is that foreign visitors valued the parks attribute when compared with the local ones.

Furthermore, economic value was computed for different improvement scenarios. As that of estimation of MWTP, welfare measures (compensated surpluses) were computed from the parameter of RPL model. Accordingly, mean willingness to pay of foreign visitors for high, medium and low impact scenarios were 432.4 birr, 347 birr and 261 birr per person per day respectively. For local visitors mean WTP were 70.8 birr, 49.6 birr and 28.4 birr respectively. This implies that foreign visitors had greater mean WTP than domestic ones. Using these results total economic value of the park was calculated. Hence, the total economic values of the park for high improvement scenarios from current level were 20,069,683.2 birr for foreign and 246,739.4 birr for local visitors, and the summation of the two WTP was estimated to be 20,316,422.6 birr per year.

Choice experiment technique was used in valuation multi-function and services of choke mountain range wetland ecosystem by Getnet (2012). The Choke Mountain Wetland area is resources base found in Northern part of Ethiopia in Amhara Regional Administration and known as water tower of the upper Blue Nile. In application of choice experiment for the valuation of the Choke Wetland Ecosystem area, four attributes were identified namely biodiversity, availability of water, recreational facilities and monetary attributes. Both basic and

an extended MNL and RPL model were applied for data collected from sample 250 farmers. All attributes in MNLs and RPL models were statistically significant in influencing the probability of choosing improvement scenarios with priory expected sign except biodiversity attribute.

Marginal willingness to pay for availability of water and recreational facilities were estimated to be birr 155 birr and 36 birr per year respectively. Furthermore, the compensated surpluses for low, medium and high impact scenarios were estimated to be 143 birr, 490 birr and 444 birr respectively. From these values total WTP per year for each improvement scenarios was estimated to be 18,885,867 birr, 64,713,810 birr and 58,638,636 birr per year for low, medium and high impact scenarios respectively.

Han et al., (2010) undertook a study using a choice experiment method to estimate the WTP for different management attributes connected 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 applied to estimate WTP for Mountain Goral population restoration, establishment of a sanctuary, education and information given to local residents, and protection 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 counted in. 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 comprised for the conservation fund. Because it is impractical to develop a questionnaire design covering all choice sets, the number of choice sets was condensed using an orthogonal fractional factorial design.

The resulting design consisted of 18 choice sets, which were allocated into six sets of three choice sets. Each questionnaire contained one of the three choice sets.

Outcomes from choice experiment for each attributes disclose that WTP for growing the number of gorals from the current status of 10 animals to 50 animals was approximately US $13.06 per household, whereas WTP for rise 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. Though respondents placed a positive value on gorals, as the number of gorals increased the value of gorals decreased. Likewise, for formation of a protection 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 safeguard zone. The last management attribute was education of and information for local residents living around the National Park. WTP of respondents 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 designate that respondents distinguish the value of educating the majority of the residents about the gorals and the effects of illegal poaching.

Birol et.al., (2006) applied choice experiment to estimate the non-use values of changes in ecological content, social and economic importance of the Cheimaditida wetland for the Greece people. Different model were employed to estimate the non-use values and preference heterogeneity of people for this multi-functions of the wetland. The applied models for this purpose were conditional logit model (CLM), random parametric logit model (RPL), random parametric logit model with interactions and latent class model (LCM). The four attributes selected for this choice experimental survey were biodiversity, open water surface area, research

and education, re-training of farmers and payment which is monetary attribute. Two wetland management scenarios were presented to the respondents.

Pseudo R^2 is low in conditional logit model but the coefficients were highly significant at less than 1% and all signs were as expected prior. All attributes included in survey were significant factors in choice of wetland management scenarios keeping other things constant. ASC was positive and significant indicating that a positive utility effect happens in any chooses from the status quo. The result from estimation of RPL model showed significant and large derived standard deviation for ASC and three attributes (open water surface area, research and education, and re-training) showing that the data supported that choice specific unconditional unobserved heterogeneity for these attributes and some respondents might prefered lower level of the attributes. The log-likelihood ratio test rejected the null hypothesis that the coefficients in RPL model were equal at 0.5% significant level. Thus, there is an improvement in the model fit with the use of RPL model. Furthermore, the RPL model interacting the socio-economic variables with choice specific attributes or with ASC. This helps the RPL model to detect preference variation in terms of both unconditional taste heterogeneity and individual characteristics (conditional heterogeneity). Accordingly, RPM model had better overall fit and its likelihood ratio taste proved as it support the data set.

Jin et al., (2012) applied the choice experiment technique in identification of preference of public for cultivated land protection in China city of Wenling. Data were collected from randomly selected individuals in the nine districts of Wenling city. From each district the respondents were selected by stratified random sampling. Accordingly, 219 individuals were surveyed using face to face interview. Three non-monetary attributes and one cost attributes were identified with their respective levels for choice experimental designation. These attributes were landscape, facility,

fertility and monetary attribute. Landscape attributes considered the service value of cultivated land with two levels. Its levels were current landscape and better amenity. The facility attribute gave focus whether government undertakes some improvement land field facilities like road and water irrigation system. It was an attribute with two levels: current fertility and better fertility level. Monetary attributes considered monthly payment on each household and had four levels. Its levels were 0, 1.56, 3.12 and 7.81 each in US$.

For the choice experimental analysis two multinomial logit models were used, basic MNL model and extended MNL i.e., multinomial logit model with attributes, four socio-economic variables (education, urban, young, income) and one knowledge variable were used as interaction variables with ASC in its indirect utility function. The results from both basic MNL model and extended MNL showed that the coefficients of all attributes and all socio-economic and knowledge variables as interaction with ASC were significant at 1% with priori expected signs. The coefficient with education, young, urban and income were positive and has implication of positive influence on improved cultivated land protection programs.

The MWTPs of all attributes were positive implying that the households had positive WTP for the improvement programs. MWTPs were calculated from coefficients of both models. Accordingly, MWTPs calculated from base model of MNL for non-monetary attribute were US$2.52, US$5.59 and US$4.54 per household per month and that calculated from extended MNL model were US$2.70, US$5.84 and US$4.84 per household per month respectively for landscape, facility and fertility.

Zewdu and Yemserach (2004) applied contingent valuation method to elicit the mean willingness to pay of the households to change in the endangered ecosystem of Nechisar National Park. They

conducted the survey using 200 house head individuals selected randomly from the households surrounding the Park's area. Dichotomous choice contingent valuation method (DCVM) with follow-up question was used and hence, bivariate probit model was applied to estimate two equations of the follow-up bids. The result indicates that the means of willingness-to-pay for protecting the endangered park for the two equations is Birr 28.34 and Birr 57.07 per household per year, respectively for equation one and two; and the determining factors of willingness to pays were identified as economic activities of the households, dependency ratio and distance from the park.

Dawit et al., (2014) employed choice experiment model for farm households' preference for collective and individual action to improve water related ecosystem services in Lake Naivasha basin in Kenya. Dawit and his co-workers used choice experimental model to elicit willingness to accept for the compensation of water related ecosystem services (WES). Thus, they identified three non-monetary attributes and one cost attribute in the basin. The three attributes were reforestation as collective attributes and two individual attributes (environmental friendly agricultural practice and restoration of riparian land). In addition to this, preferences of upstream farm households were analyzed with regards to sub-basins where payment for water related ecosystem (PWES) has already been implemented.

A choice experiment approach was employed by Milon & Scrogin (2006) to evaluate the effects of socio-economic variables and characteristics of wetland attribute on the value of wetland resources. To achieve these two objectives, the study employed three functional and structural attributes. These are Lake Okeechobee water level and timing, and water conservation areas water levels and timing, an Everglades national park and Florida Bay water levels and timing. In addition to these other three social attributes: annual cost per household, restriction on household

outdoor and indoor water use and conversion of farmland to wetlands were combined. Three levels for both the ecosystem and socio-economic attributes were specified. Choice sets were formed by excluding the baseline (do nothing) options. By applying fractional factorial method 27 choice sets which were blocked in to two groups were formed. A total of 1680 choices were collected from the 480 sample of respondents. The latent class model result revealed that preferences for wetland ecosystem restoration differ as the function and structure of the ecosystem varies. In addition to these, socio-economic as well as the attitudinal variables of the respondents also influenced the value of these resources.

The above empirical works reveal the existence of various studies on the valuation of wetland ecosystem in Ethiopia and different parts of the world. However, in this research, comprehensive studies on valuation of the multi-functions and services of park ecosystem have limited in the country in general and Nechisar National Park in particular. Thus, this study will be expected to narrow the methodological and literature gap in the country by applying Choice experimental approach in estimating the economic benefit of Nechisar National Park's ecosystem and tourists' preferences at the site.

CHAPTER THREE

METHODOLOGY

3.1. Description of the Area

The establishment and administration of wildlife protected areas in Ethiopia emerged from a 1962 UNESCO mission's proposal. Then, surveys were conducted in 1964 and 1965 in most of the main wildlife areas. Arising from these surveys, establishment of Awash and Simien mountains national parks including Nechisar National Park were followed from 1966 onwards by the then Ethiopian wildlife conservation organization (EWCO) intending to conserve selected ecosystems for the preservation of vital ecological processes and life support systems, and certify the survivals of endemic and endangered species of the country. The NNP was established in 1974 in the scenic part of the Rift Valley floor between the two lakes namely Abaya and Chamo. The Park covers an area of 514 km² near the town of Arba Minch at a distance of 500 km from Addis Ababa in southern Ethiopia. Seventy eight square kilometers (or 15% of total coverage) is water (Nechisar brochure, 2013). It is located between 5^0 51'- 6^0 50'N latitude and 37^0 32'-37^0 48'E longitude in the Southern Nations, Nationalities and Peoples Regional State (SNNPRS) at the center of Ethiopian Rift valley with an altitudinal range of 1,108-1,650 m.a.s.l (Bolton, 1970). Look at fig.1 below.

The management and administration point of view, NNP experienced different management and administration bodies including private and government agencies. Starting from its establishment, the Ethiopian Wildlife Conservation Organization (EWCO) was the exclusive government agency responsible for conservation, development and management of wildlife

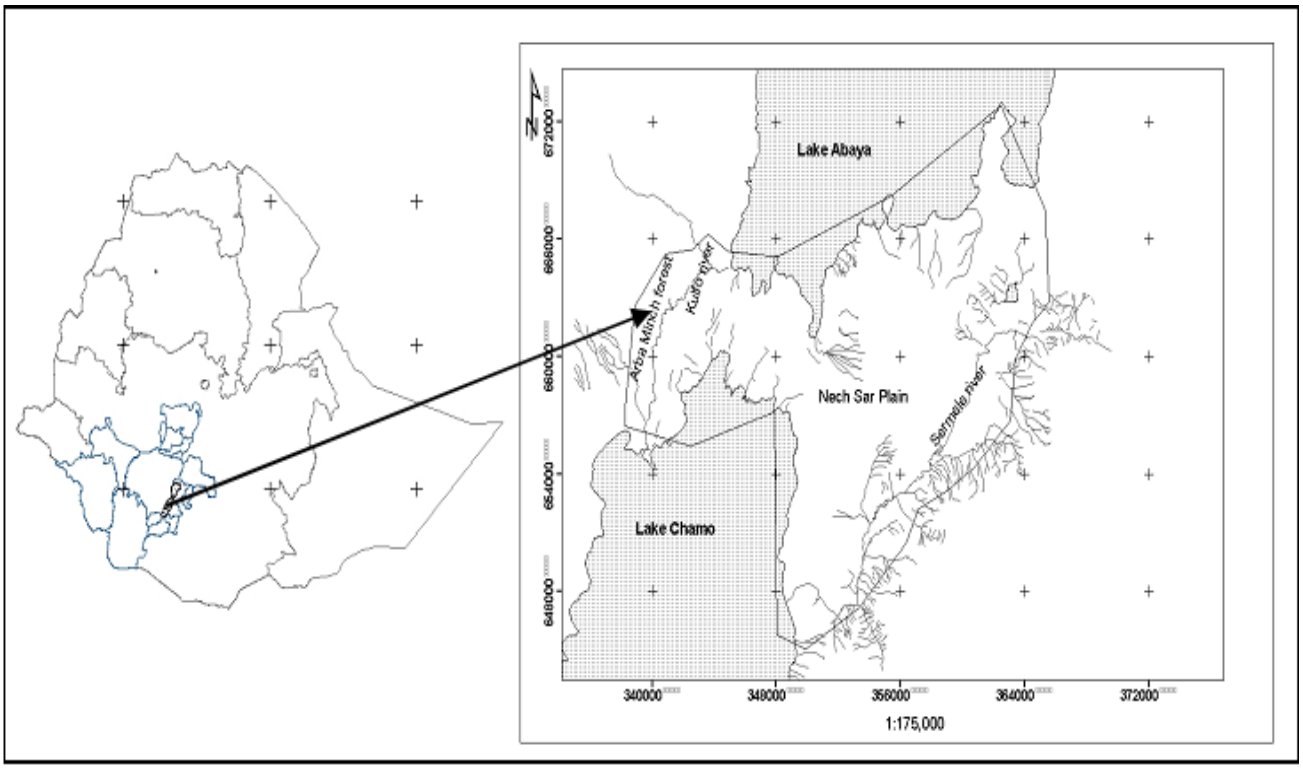
resources until decentralization took place in 1991. Next to EWCO the administration and management of NNP was handed over to its corresponding bureau of the region in 1994. This management continued until African Parks (private organization) took over this responsibility in November 2005, and then by the bureau of the region from June 2008 up to June 2009 then Ethiopian wildlife conservation authority (EWCA) started to manage the park up to present time (Nechisar brochure, 2013).

The Park is bounded to the east by the Amaro Mountains, to the west of the town of Arba Minch and to the north and south by lakes Abaya and Chamo, respectively. In the far eastern part of the park, hot springs bubble to the surface, while numerous natural springs known as Arba Minch (meaning 'forty springs') are found in the western most extreme of the Park. There are, two main river systems that flow through the park forming riverine forests and woodlands. Sermele River crosses north-south at the eastern part of the park along the grassy plains and acacia woodlands and meets with Miyo River. The Kulfo River flows through the north of Arba Minch and then cuts across the neck of the narrow land and ends in a swamp on the shore of Lake Chamo (Tamrat, 2001).

The park contains more than 90 mammal species and it supports more than 351 species of birds of which three species that are little known in Ethiopia are white-tailed lark, the endemic Nechisar nightjar and the rare star-spotted nightjar (Nechisar brochure, 2013). The park also serves as the destination of many Palearctic and intra-Africa migrants birds (Duckworth et al, 1992). It is classified as one of the sixty-nine important bird areas in Ethiopia. Large mammals currently present in the study area are the common zebra, swayne's hartebeest, grant's gazelle, greater kudu, guenther's dikdik, anabus baboon, black and white colobus, hippopotamus, spotted hyena, mountain reedbuck, black-backed jackal, side striped jackal,

golden jackal, defassa waterbuck, bushbuck, klipspringer, warthog and bush pig. Leopard and lions are also occasionally seen (Whitaker, 2007). A part of the northwest shoreline of Lake Chamo is known as Crocodile Market, where abundant and very large crocodiles in which many of them are in excess of 5m length gathered to sun themselves. Furthermore, the park is home to the largest hippo population in Ethiopia, abundant fish including Nile perch, diverse insects of which 69% of the butter flies species in Ethiopia are recorded in NNP and 20% of them are endemic. Eighteen species of dragon flies are recorded (Nechisar brochure, 2013; Whitaker, 2007).

The Arba Minch ground water forests, Kulfo and Sermele riverine forests are found within the area of NNP (Duckworth et al., 1992). The ground water forests and the Sermele valley forests are located in the western and eastern part of the park, respectively and the Kulfo riverine forest is located in between the two forests. Figure 1 map of the study area



3.2. Data and Methodology

This study employed standard approach of non-market valuation technique (choice experiment method) to estimate the economic benefits and preferences of tourists at Nechisar National Park.

3.2.1. The Data Sources and Type

To estimate the economic value of Nechisar National Park, primary data was collected through on site face-to-face interviews using structured questionnaire from June 20, 2015-August 10, 2015. This period was preferred by the researcher because most relatively high flow of domestic tourists though it not for international tourists. The collected data consist of the visitors' socioeconomic characteristics, preferences of visitors to different attributes of the park and other important information necessary to estimate the economic value of the park.

3.2.2. Sampling Technique

Purposive sampling technique was applied to conduct this survey on the site of Nechisar National Park. In purposive sampling technique, researcher uses his or her own judgment about which respondents to choose, and picks those who best meets the purposes of the study. It is Much less complicated, less expensive and can take advantage of whoever is available. Visitors were interviewed purposively, because it is costly both in time and financially to collect data using probabilistic sampling technique. A probabilistic sampling is one in which each element of the population has a known non-zero probability of selection to be interviewed. Therefore, using probabilistic sampling technique take a year to make potential tourists equal chance to be selected. Furthermore, it is impossible to use probabilistic sampling technique even in a short time period as the target population of this study is annual tourists' flow.

The sample representatives for this survey were derived from annual tourists' flow of NNP. The visitors' statistical experience of the year 2013/2014 was taken as total target population for the proxy of target population of the study year (or 2014/15) because the target population of the study year was not fully available. According to data of NNP administrative office, the total tourists' flow of the year 2013/14 was twenty five thousand, eight hundred eighty four (25,884) visitors. From these, eleven thousand seven hundred thirty (11,730) were international and fourteen thousand one hundred fifty four (14,154) tourists were local tourists. Following Yemane (1968) sample size determination formula, it was determined as follow:

$$n = \frac{N}{1+N(e)^2} \quad \ldots\ldots (1)$$

Where n = sample size, N = size of target population and e = level of precision

The sample size was determined as follow using the above formula

$$n = \frac{25884}{1+25884(0.07)^2} = 202$$

From this calculated level of sample, the proportion of foreign and local tourists is 91 and 111 respectively. However, the total number of tourists interviewed was 210, of which 90 and 120 respondents were foreign and local respectively. One foreign respondent's questionnaire was not properly filled whereas the number of local respondents interviewed was above the calculated sample proportion.

3.2.3. The Choice Experiment Model Specification

In a choice experiment analysis respondents are offered with a series of choices, which are different attributes and attributes levels, and asked to choose their best choice. A baselines or

status quo is usually included in each choice set. This is because one of the choices must always be included in the respondent's currently feasible choice set to interpret the results in the standard welfare economic terms (Hanely et al., 2001).

The CE technique depends on two fundamental microeconomic theories: Lancaster's characteristics theory of value (Lancaster, 1966) and random utility theory (Adamowicz et al., 1994; Boxall et al., 1996). Lancaster's theory states that choice can be modeled as a function of characteristics, or attributes of the alternative relevant to a given choice problem. The random utility theory assumes that the alternative with the greatest total utility is selected. According to random utility theory the utility function for a representative consumer can be separated into a systematic or observable portion and a random or unobservable portion by the analysts. Hence, the random utility function takes the following form (Jianjun et al. 2013):

$$U_{in} = V_{in} + \varepsilon_{in} \quad \ldots\ldots (2)$$

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

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

$$P(i/C) = Pr[U_{in} > U_{jn}] = Pr[(V_{in} + \varepsilon_{in}) > (V_{jn} + \varepsilon_{jn})], \forall_j \epsilon C \quad \ldots\ldots (3)$$

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

$$\text{Prob (i)} = \frac{\exp(\mu Vit)}{\sum \exp(\mu Vjt)},\ V_{it} \neq V_{jt};\ j \in C \quad \ldots\ldots (4)$$

Where V_{it} and V_{jt} are indirect utility functions assumed to be linear in parameters and, μ is scale parameter inversely related to the standard deviation of the error term and is not separately identified in a single data set, this implies that the estimated β's cannot be interpreted as their contribution to utility since they are confounded with the scale parameter. When using the MNL model the other assumption that must be satisfied is the Independence of Irrelevant alternatives (IIA) choices. This property follows from the independency of the error terms across the different options contained in the choice set. It states that the relative probabilities of two options being selected are not affected by introduction or removal of other alternatives (Louviere et al., 2000; Hanely et al., 2006). Formulating MNL model along constants called Alternative Specific Constants (ASCs) is normal. The usual form of V_{it} is an additive form, which includes the attributes from the choice set only,

$$V_{it} = ASC_i + \sum \beta_{ik} X_{ik} \quad \ldots\ldots (5)$$

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

Socioeconomic and/or attitudinal variables can be included into the utility functions by estimating the variables interactively with the ASC (Jianjun et al. 2013)

$$V_{it} = ASC_i + \sum_k \beta_k X_k + \sum_h \gamma_{iht}(ASC_i \times S_{ht}) \quad (6)$$

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

3.2.3.1. Random Parameter Logit Model (RPL)

There are two major limitation of the multinomial logit model (Train, 2003). First, the model does not recognize the correlation of error term across alternatives. This comes from the assumption of independency of irrelevant alternatives (IIA) which is unrealistic. IIA assumption rises as a result of IID assumption of random term. Second, it assumes homogeneous preferences across respondents. However, preferences are in fact heterogeneous and accounting for this heterogeneity enables estimation of unbiased estimates of individual preferences and enhances the accuracy and reliability of estimates of demand, participation, marginal and total welfare (Greene, 1997). Moreover, (Boxall and Adamowicz, 2002) mentioned that, accounting for heterogeneity enables prescription of policies that take equity consideration into account. Thus, the random parameter logit (RPL) model (Train, 1998), relaxes IIA assumption and accounts for unobserved and unconditional heterogeneity, should be used to account for preference heterogeneity in pure public goods like national parks though it is statistically complex (Shen, 2005; Birol, et al., 2006; Vojacek and Pecakova, 2010)

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

$$U_{it} = V_{it} + \varepsilon_{it} = Z_i (\beta + \eta_t) + \varepsilon_{it} \quad (7)$$

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 components (V_{it}) and stochastic component (ε_{it}). The indirect utility is assumed to be a function of the choice attributes Z with parameters β (and socioeconomic and environmental attitudinal variables, if included in the model), which due to preference heterogeneity may vary across respondents by a random component η_t

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

$$P_{it} = \frac{e^{Z_{it}(\beta + \eta_t)}}{\sum e^{Z_{jt}(\beta + \eta t)}} \quad (8)$$

3.2.3.2. Implicit Price

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

$$\text{Implicit price (WTP)} = -\left(\frac{\beta_{parkattribute}}{\beta monetary}\right) \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (9)$$

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

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

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

$$\text{Compensating surplus (CS)} = \frac{V^1 - V^0}{\beta_{Monetary\ attribute}} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (10)$$

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

3.2.3.3. Specification of Equation of Choice Experiment Model

Multinomial logit model is the most easy and straight forward in estimation of choice modeling. Under this model, the probability of selecting option (alternative) is formulated as a function of attributes and socio-economic variables of the respondents (Bennet, 1999). Two possible ways of estimating multinomial logistic model are available (model 1 and extended MNL or model 2). However, only model 1 was estimated in thesis work using data collected from the visitors of Nechisar National Park with Limdep Nlogit 5 software. Model 1 is estimation of the three utility functions of three options only as a function of attributes without making interactions of socio-economic variables with the main attributes or ASC (alternative specific constant) whereas model 2 is estimation of the utility functions using interaction of socio-economic variables with ASCs or attributes. The three options/plans are the two improvement plans (plan 1 and 2) with changes in attributes and status quo (plan 3) level. Accordingly, three indirect utility functions were developed from Multinomial logistic model. Each of the indirect utility functions represents the utility created by the three options: option 1 and 2 (improvement options) and option 3 (status quo option). The specification of the models will be as follow.

Model 1: Basic Model

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

$$V_i=ASC+B_1AFFR\_A+B_2WLP\_A+B_3ADSER+B_4ENTFEE \quad (11)$$

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

$V_1 = \beta_1 AFFR\_A + \beta_2 WLP\_A + \beta_3 ADSER + \beta_4 ENTFEE$

$V_2 = ASC + \beta_1 AFFR\_A + \beta_2 WLP\_A + \beta_3 ADSER + \beta_4 ENTFEE$

$V_3 = ASC + \beta_1 AFFR\_A + \beta_2 WLP\_A + \beta_3 ADSER + \beta_4 ENTFEE$

The β values (β_1, β_2, β_3 and β_4) are the coefficients associated with each of the attributes, namely AFFR_A, WLP_A, ADSER and ENTFEE respectively.

Notice: The ASCs used for V_1 and V_2 are assumed to be the same. This shows that the model under specification is generic (unlabeled). If the choice sets used were not generic one (labeled), an alternative specific from the model under specification would be needed. This leads to using ASC_1 and ASC_2 respectively for each improvement equations as well as differing coefficients of potential attributes Bennet, (1999).

3.2.3.4. Definition of Variables and Hypothesis in CE

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

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

WILDLIFE: This attribute stands for the number of the wildlife living in the park's ecosystem both common wildlife and endemic mammals such as Swayne's Hartebeest. Improving the

number of wild animals living in the park in quantity and quality is expected to have positive relationship with the utility level of the visitors.

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

ENTRANCE FEE: This is a monetary outlay that visitors are charged in birr per day to visit the park. It is expected to have negative relationship with the utility level visitors get by visiting the park, because an increase in cost decreases the utility of the visitors.

3.2.4. Design of a Choice Experiment

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

3.2.4.1. Description of Attributes and their Levels

Identification of attributes and their levels that helps to describe the impacts of alternative policy scenarios is a major task in a choice experiment methodology (Kragt 2009).The attributes are used to describe the results of continuation of status quo and what would happen if an alternative were to be introduced. Two perspectives of these results need to be taken into account when identifying relevant attributes. The first one is that the attributes used to describe the alternatives in each choice profile should be relevant to the policy making process. Thus, they should be consistent with the policy tools that are being used to form the results shown in the alternatives. Second, the attributes included must give a sense for the respondents of the questionnaire (Bennett, 1999). Accordingly, determination of the relevant attributes in Nechisar National Park involved an extensive literature review and discussion with Nechisar National Park's administrative staff that they are relevant enough in perspective of policy makers and respondents. Furthermore, after the attributes are defined, the range over which they vary must be determined. The attributes must be allowed to vary across levels that are realistic. The range must however be sufficiently large to reflect the possible future values the attributes could take under all the policy options being considered (Bennett, 1999). In this research project four attributes were identified and set with their respective levels.

Afforestation: the first attribute of the study is afforestation, planting new indigenous trees that easily adapts to the environment of the park. In the area, forest serves as one of scenery views for tourist attraction in addition to its regular ecosystem services. The ecosystem services provided by healthy forests include protection of water quality and supply (hydrological services), Sequestration and storage of greenhouse gases, removal of air pollutants, storm water storage, soil formation and retention, pollination of plants and habitat of wild animals

(Mates and Reyes,2004). These regular ecosystems services are under question if a great care and conservations are not provided by all the concerned forest nearby communities and legal entities, park management for the protected areas.

Nechisar National Park is home of various types of forests. Namely, Arba Minch Ground water forest, riverine forest and deciduous bush land forest. Ground Water forest is located in the west near park's headquarter with low ground water table that supports a dense ground water forest that harbors diverse floristic make-up. The riverine forest occurs as narrow strips along the Kulfo River with dense vegetation and tall trees along the banks of a river. It has a small area of spring-fed ground water forest along the base of the scrap at the eastern edge of Arba Minch stream and also along the better drained parts of the shore of Lake Abaya. On the other hand the deciduous bush land forest of Arba Minch dominates areas further away from the riverine forests, with gently sloping terrain, as well as gullies. An abrupt variation in the woody vegetation composition and densities of the bush lands is evident in the southwest of Arba Minch stream and in the east of Kulfo River (Datiko, no date). These three types of forests summed up to make Arba Minch Forest which is home of diversified wild animals in addition to other ecosystem services mentioned above. But this rich ecosystem area is under serious destruction if proper measurement would not be taken as a counter solution. There are various factors that contribute for the destruction of natural forests. Different researchers identified as the main cause of Arba Minch forest destruction is people around the park. According to Aregu and Demeke (2006) and Kelboro and Stellmacher (2012) following the rapid expansion of Arba Minch town due to formation privatized of state farms, establishment of different institutions and potentiality of the town for resources, the immigrants of Gamo Highlands and the residents of Arba Minch town contributed for the rapid depletion of Arba

Minch natural forest due to high demand of forest productions. These people utilized the forest for timber and firewood collection for subsistence and income generation. Moreover, (Aregu and Demeke, 2006) construction of Arba Minch National Airport resulted in the removal of 203 hectare of the natural forest.

If the current conditions continue in such away the local community would loss any benefit that it may get from forest and the associated wild animals would be in a great risk. The forty springs discharged from Arba Minch Ground Water forest which is the major tributaries of Lake Chamo and the sources of Arba Minch town water supply could be in danger of water flow variability. Thus, the destruction of the forest affects not only the wild life harbored in the forests but also the downstream resources, the crocodile, hippopotamus and fishery resources in the Lake Chamo. In such a high destructive rate of deforestation, the park's environment will reach to the point where it cannot support the community and the wild animals within it. Furthermore, the park would loss its panoramic view and no more tourists visit would be available. To reverse these situations, the park's management has to take a leading role that involves all stakeholders in integrating forest and wildlife management in conserving the forest and wildlife in a sustainable base. This in turn results in an attractive recreational environment. Therefore, planting additional new trees will play a great role; hence afforestation is a relevant attribute.

Wildlife population is the second attribute of this study. Wildlife populations in Ethiopia as a general were under continuous threat, despite the presence of parks and protected areas, over the past several decades due to the anthropogenic factors like deforestation, farm expansion and illegal hunting (Tefera, 2011). The situation is not different at Nechisar National park. For instance, Human encroachment by Guji pastoralists and Kore agro-pastoralists living in and adjacent to the Park were the main threats to the park's wildlife. In 2010, about 531 Guji

households with a total of 43,542 cattle were living inside the park and were grazing in the grass land plains. The cattle population reached beyond the carrying capacity of the plains and resulted in habitat destruction of wildlife living on the grass land plains. On this wildlife habitat, common share of the grassland plains by wildlife and domestic animals created the problem of diseases transmission to and from wild animals, and the presence of domestic animals in the Park made the park less attractive to the visitors (Fetene et al., 2012). Furthermore Illegal hunting of wild animals (Aregu and Demeke, 2006) by the nearby agro pastoralist for their meat and skin also hindered the wildlife of the park. Especially, the Swayne's Hartebeest, (Yisehak et al., 2006) the endemic animals of Ethiopia, is critically endangered due to illegal hunting and habitat destruction. According to the recent official data of the Nechisar National Park Administration office, the number of Swayne's Hartebeest living in the park reached to only two individuals. Therefore, making the park open only for recreation is demanded. This is possible through community integrating conservation mechanism by creating management zones in the park. According to (Diego 2001; Nelson and Makko 2005) management zoning helps to divide protected areas into core protection zones, used only for wildlife conservation and buffer zones used by local people that reduce pressure on core areas. In buffer zone local people can undertake their full management responsibility. In such away the opportunity cost of wildlife conservation is insignificant that the returns to wildlife tourism will be attractive. Therefore, increasing the number of endangered and other common wildlife will be unquestionable policy option.

Additional services for the visitors of the park are among the attributes proposed for this study. Nechisar National Park is one of the naturally enriched protected area harboring diversified flora and fauna, The panoramic land view located between the two lakes i.e. Lake Abaya and Chamo

separated by a narrow land feature known as 'Yegzer-Deldiy' are among tourist attracting elements of the park. Having all these charming elements within the park, the surrounding community and the park administration were not able to exploit the available opportunity by absorbing potential tourist flows. Because, the park lacked the facilities demanded by tourists while moving to and recreating in the park. When tourists move to the park, roads to the park and within the park is harsh and make inconvenience trips and make tourists less attractive to visit the park's environment. Another challenge is the absence of facilities such as toilets, showers, shops, recreational benches along the shore of the two lakes, modern swimming pools, camping equipment such as tents, cabins, sleeping bags, mattress and cooking gears, information provision center, library/museum, maps, health center and medical treatment, enough and well trained tour guides and scouts, renting a kind of transportation like bicycle and traditional transportation like mules and horses. On visiting the park, campsites were not properly organized and no other option like provided community based lodges, hotels for visitors to stay in the park. Therefore, most visitors stay overnights at Arba Minch town which is very costly and unaffordable for domestic visitors. Therefore, to make park very conducive and attractive recreational site all the above mentioned lacked facilities should be provided at proper places, especially constructing modern shower rooms, shops, toilets, furnishing lodges and hotels by wireless internet services (Wi-Fi), modern swimming pools, fixed telephone services near forty springs and hot springs are crucial value adding facilities and thus provision of general services is a relevant attributes.

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

Table 3.1 Description of attributes and their levels

Attributes	Description	Levels
Afforestation	This program will focus on Planting new native trees on the degraded areas and covering surrounding landscapes which were covered by bush land and other invasive plants. Thus, the park's ecosystem services will be improved.	A. Expanding forest coverage by 75% B. Expanding forest coverage by 50% C. Expanding forest coverage by 25% **D. No increment of forest coverage(status quo level of 2012 hectares)**
Wildlife	This will focus on increasing the number of both endemic and common wildlife. Management zones will be developed within the park; creation of core protection area of wild animals and buffer zone in which pastoralists and agro pastoralists carry out their respective livelihood. Therefore, there will be no space and food competition between wild life and domestic animals that grassland plain and other habitats will be used exclusively by wild animals. The plan will also focus on the controlling of illegal hunting.	A. High, increasing the number of wildlife by 100% B. Medium, increasing the number of wildlife to medium level by 75% C. **Low,(status quo level) for status quo level the number of representative[1] wildlife was taken)**
General services	In this regard the plan will need to have improved and well organized general services for visitors, such as camping equipment, improved roads, on site resting places (hotels and lodges), transportation facilities within the park and the other mentioned facilities. Thus, Nechisar National Park will be a corridor of	A. Construction of road to and within the park that is easily accessible by any transportation means and other facilities[2] B. Construction of roads within the park that is easily accessible by

[1] the representative wildlife are those including the endemic and the critically endangered animal, Swayne's Hartebeest, and other those assumed to have significant tourism effect and the conservation mechanism applied for them will have positive spillover effect for the remaining wildlife in the Park. Name of animals with their respective number of status quo level in bracket: Swayne's Harte beest (2), Buchell's Zebra (2193), Grant's gazelle (1019), Greater kudu (98), Lesser kudu (27), Common bushbuck (158), Columbus monkey (67), Anubis baboon (258), Common warthog (114), Guanter'sdikdik (46), Waterback (284).

[2] includes provision of information, library/museum, and map, toilets, shower rooms, shops, modern swimming pools and resting benches near the Forty springs and hot springs.

	tourist destination.	any transportation means and other facilities[3] C. Construction of lodges and hotels not furnished with Wi-Fi) and other facilities[4] **D. No provision of general services or status quo level**
Entrance fee	Making entrance fee greater than present level paid by tourists to finance any types of facilities at the park.	**Scenario 1(domestic visitors)** A. 50 birr B. 40 birr C. 30 birr D. **20 birr (status quo level)** Scenario 2 (foreign visitors**)** A. 120 birr B. 110 birr C. 100 birr **D. 90 birr (status quo)**

3.2.4.2. Experimental Design

Experimental design is the paramount stage in choice experiment designation process. It deals with ways of creation of choice set in an efficient way, i.e. it is the process of combining attribute levels into profiles of alternatives and formation of choice sets. Experimental design is developed into two ways. (i) Obtaining the optimal combinations of attributes and attributes levels to be used in the experiment and (ii) combining those profiles into choice sets (Alpizar et

[3] includes hotels and lodges furnished with communicative facilities such as Wi-Fi and fixed telephone near forty springs and hot spring, health and medical treatment tents, mattress, sleeping bags and cooking gears.

[4] includes hotels and lodges furnished with communicative facilities such as Wi-Fi and fixed telephone near forty springs and hot springs, enough and well trained tour guides and scouts, provision of health and medical treatment, renting transportation means like bicycle, motor bikes, horse and mules.

al., 2001). For this process, a starting point is a full factorial design. A full factorial design includes all possible combination of attributes and their respective levels. If all possible combinations are included, a full factorial design allows for estimation of main effects and all interaction effects independently of one another. However, combination of all possible full factorial is very large and not tractable in experiment. To avoid this problem, fractional factorial design is usually implemented. A fractional factorial design is a sample of full factorial design that allows the estimation of all effects of interest, i.e. main effects only or main effects plus some interaction effects. Full and fractional factorial design can also be blocked into different versions to which respondents are randomly assigned. Fractional factorial designs can be orthogonal i.e. there is no correlation between the attribute levels or the so-called efficient designs pursuing the minimum predicted standard errors of the parameter estimates (Hoyos, 2010).

In this thesis work, for attributes were identified for experimental designation. The attributes considered were afforestation, wildlife population, additional services and entrance fee with their respective levels. Levels of each attributes of the park ecosystem were assigned so that afforestation, additional services and entrance fee each with four levels and wildlife population with three levels. From the levels of the attributes 192 (4^3*3^1) possible combinations would be created in full factorial design. However, using the possible combinations of this full factorial creates difficulties and respondents couldn't cope up with the survey's burden. As expressed in Bennett, (1999) two mechanisms are available to overcome this problem: using fractional factorial and blocking of experimental design. Fractional factorial is reducing the full factorial profiles into minimum number that maintain orthogonal property of the full factorial combinations. Accordingly, from 192 possible combinations of all attributes and levels, 9

efficient choice sets were created using SAS in orthogonal design method using OPTEX procedure. The second mechanism in which large number of choice set further managed is to segment fractional factorial into number of blocks. Hence, we blocked nine choice sets in to three groups. Finally, three choice sets were randomly assigned to the respondents and ach respondents confronted with the choice sets with three options (alternatives). One sample choice set is given in table 3.2 as example.

Table 3.2 Sample choice set

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

Attributes	Option 1	Option 2	**Option 3 (status quo)**
Afforestation	Expanding forest coverage by 25%	Expanding forest coverage by 100%	No increment of forest coverage **(2012 hectares**)
Wildlife	**high**, increasing the number of wildlife by 100%	**medium**, increasing the number of wildlife to medium level by 75%	**Low**, (for status quo level the number of representative[5] wildlife were taken)
Additional services	Provision of camp sites furnished with tents, mattress, sleeping bags and cooking gears and other facilities[6]	Construction of well accessible roads to and within the park, and other facilities[7]	status quo level
Entrance fee	100 birr	110 birr	**90 birr**

[5] the representative wildlife are those including the endemic and the critically endangered animal, Swayne's Hartebeest, and other those assumed to have significant tourism effect and the conservation mechanism applied for them will have positive spillover effect for the remaining wildlife in the Park. Name of animals with their respective number of status quo level in bracket: Swayne's Harte beest (2), Buchell's Zebra (2193), Grant's gazelle (1019), Greater kudu (98), Lesser kudu (27), Common bushbuck (158), Columbus monkey (67), Anubis baboon (258), Common warthog (114), Guanter'sdikdik (46), Waterback (284).

[6] including renting onsite transportation means like **bicycle, motor bikes, horses** and **mules**.

[7] including **construction of onsite hotels and lodges** furnished with communicative facilities like **Wi-Fi** and **fixed telephone** on proper places within the park**, information center, well trained additional scouts and tour guides, protected tourist zone.**

I prefer (please tick in the box)	☐	☐	☐

3.2.4.3. Questionnaire Development

In a choice experiment development of the questionnaire is the third issue. It includes preparation of general questions and choice experimental questions for the respondents. Most of the time choice experimental survey starts with introduction plan to (i) make the respondents convenience with answering the questions, (ii) leading the respondents into the topic of the survey, and (iii) informing the respondents the objective of the survey.

The questionnaire for the choice experiment was divided into four parts. The first part includes the socio-economic issues of the respondents like income, age, marital status of the respondents, family size, number of dependents, type of occupation, level of education and nationality. Questions about general perception and observation about the park for the respondents was followed. The follow up questions helps to investigate the respondents' attitudes and observations regarding to the park's ecosystem.

The next part the questionnaire contains the choice experiment questions follow three choice set with three options (alternatives) including the baseline (status quo). Before the choice experiment sets, choice experiment scenarios description was presented to the respondents. The scenario description was about Nechisar National Park ecosystem, about attributes including cost attribute as a payment Vehicle and levels of each attributes.

Following choice experiment exercise, a series of questions designed to explore the motivations behind the respondent's choices, particularly, follow-up questions targeted at picking up any response deviations such as payment vehicle's protest, lexicographic preferences and perfect embedding. Furthermore, follow up questions can help to see if there were any specific problems encountered by respondents in answering the experimental questions like ability to understand the questions, the amount of information provided, the presence of bias in the questionnaire, perceived plausibility of the setting and confusion created.

CHAPTER FOUR

EMPIRICAL RESULTS AND DISCUSSION

4.1.Descriptive Statistics

According to the data of the office of Nechisar National Park administration of the 2013/2014, the tourist flows in the park's ecosystem area was amounted to be twenty five thousand eight hundred eighty four (25,884). Among these tourists' flow eleven thousand seven hundred thirty (11,730) were foreign visitors and fourteen thousand one hundred fifty four (14,154) were domestic visitors. The figure shows that from the annual tourist flow of NNP the dominating number was domestic tourists. Local visitors came from various part of the country including the nearby visitors from the town of Arba Minch where as foreign visitors were from Europe, America and Asia. As a country level, most of the visitors were from Spain, France, German, Italy, England, Belgium and Israel.

Statistical descriptions of the socioeconomic variables were provided in table 4.1 given below. Accordingly, visitors of the Nechisar National Park's ecosystem were both males and females. Among domestic visitors males and females were 56% and 45% respectively where as 75% and 25% were foreign males and females respectively. The mean ages of foreign visitors were 36.42 and that of local visitors were 33.5 years. Out of total visitors about 56% and 53% of both foreign and domestic visitors got married respectively, where as 44% and 47% of the sample visitors were not tied by marriage relationship. According to the questionnaire survey handed to the sampled visitors, those outside marriage relationship who have been living as a single, divorced and cohabitation without marriage. Average family sizes of the visitors were 2.58 and 2.46 for both foreign and local visitors respectively. Respondents' level of education was 17.71 and 15.39 years respectively for both foreign and local visitors. Thus, visitors of the park were

100% literate people. Average monthly income of the international visitors was 94869.5 birr ($4543.56) and that of local visitors were 5854.98 birr ($280.41). About 98% and 88% of foreign and domestic visitors were full time employees respectively. About 2% of foreign and 12% of local visitors were not full time employees. They were students and unemployed individuals. Full time employment indicated those employees of public sectors, private sectors, NGOs (non-governmental organizations), own business, international organizations. Out of total respondents, about 43% were international tourists whereas about 57% were domestic tourists.

Table 4.1: Descriptive statistics of the socio-economic and trip variables of the sampled visitors

Variables	Variables description	Foreign visitors Mean std.dev.)	Domestic visitors Mean (std.dev.)
Socioeconomic characteristics of the visitors			
Gender	Gender of the visitors (dummy as 1=male and 0=female	0.56(0.4997)	0.75(0.43)
Age	Age of visitors (in years)	36.42(8.22)	33.5(9.63)
Mar. status	Marital status of the visitors (dummy as 1=married and 0=otherwise)	0.56(0.4997)	0.53(0.50)
Famsize	Total number of people in the visitor's household	2.5778(1.4532)	2.46(1.77)
Edu.	Level of education of the visitors (in years)	17.71(2.11)	15.39(2.27)
Income	Monthly income level of the visitors (in birr)	94869.5(47939.5)	5854.98(4467.74)
Employment	Visitors' basis of employment (dummy as 1=full time and 0=otherwise)	0.98(0.15)	0.88(0.32)
Nationality	Whether the visitor were foreign or local(dummy as 1=domestic and 0=foreign)	0.4312(0.4964)	0.5714(0.4962)

4.2.General Perception and Observation about Nechisar National Park

The visitors were asked about the present situations of NNP and ranked the problems from the most severe to less threatening. This helps to better understand the visitors' perception regarding the park's problems. Table 4.3 and 4.4 give the summary as follow:

Table 4.2 major problems at the park reducing the recreational quality of the park, local data

	Domestic respondents													
Degree	1st		2nd		3rd		4th		5th		6th		7th	
	Fr.	%	Fr.	%	Fr.	%	Fr.	%	Fr.	%	Fr.	%	Fr.	%
Forest and landscape degradation of the area	20	16.7	13	10.8	20	16.7	28	23.3	8	8.3	**28**	23.3	3	2.5
Lack of protected tourist zone	4	3.3	11	9.2	13	10.8	23	19.2	**28**	28.3	24	23.3	17	14.2
Lack of appropriate resting facilities around forty springs and hot springs	6	5	7	5.8	21	17.5	**32**	26.7	27	28.3	19	15.8	10	0.8
Difficulties of access roads to and within a park	17	14.2	31	25.8	**22**	18.3	10	0.08	26	15.8	19	15.8	2	1.7
Lack of modern swimming pool and toilet facilities	9	7.5	**40**	33.3	21	17.5	10	0.08	17	14.2	14	11.7	9	7.5
Lack of facilities like information provision , rented transportation means like mules, horses and bicycle, shops for materials and fast foods	**49**	40.8	16	13.3	19	15.8	9	7.5	4	3.3	4	3.3	19	15.8
Hot temperature	15	12.5	2	1.7	4	3.3	8	6.7	10	10	12	10	**69**	57.5

As observed from table 4.2 above, domestic respondents ranked lack of facilities like information provision, rented transportation means like mules, horses and bicycle, shops for materials and fast foods as the most severe which was reported as the most frequent problem by the majority of the respondents (i.e. 40.8 % of the respondents). Next to lack of facilities at the park, local tourists ranked Lack of modern swimming pool as the second major problem. From the conducted survey 40 respondents (33.3% of the respondents) of local visitors placed this problem on the second place. Difficulties of access of roads, lack appropriate resting facilities, lack of protected zone, forest and land degradation, and hot temperature were ranked from third to seventh respectively by local tourists.

From the survey conducted on international visitors 34 respondents (37.8% of the respondents) ranked lack of facilities like information provision, rented transportation means like mules, horses and bicycle, shops for materials and fast foods. This gives justification that lack of the facilities created disutility for both domestic and foreign tourists. In fact none of these services were provided at the site. International tourists' perception was the same with domestic tourists' perception that ranked Lack of modern swimming pool as the second problem. From the conducted survey, 21 respondents (22.2% of the respondents) of international visitors placed this problem on the second place. In this case there was no modern swimming pool on site except the traditional one filled with broad leaves fall from trees. Local visitors have been using traditional swimming pool nearby forty springs. This traditional swimming pool was surrounded by unclean environment and filled by broad leaves fall from nearby tree making inconvenience for tourists to enjoy it. International tourists' ranked lack of appropriate resting facilities, access roads, lack of protected tourists' zone, forest and land degradation and hot temperature from third to seventh respectively. The ranked major problems reducing the recreational quality of the

park with their frequency and percentage of responses for foreign tourists were presented by the following table.

Table 4.3 Major problems at the park reducing the recreational quality of the park foreign tourist data

	Foreign respondents													
Degree	1st		2nd		3rd		4th		5th		6th		7th	
Forest and landscape degradation of the area	16	17.8	20	22.2	3	3.3	18	20	4	4.4	**24**	26.7	5	5.6
Lack of protected tourist zone	8	0.09	11	12.2	14	15.6	**24**	26.7	13	14.4	15	16.7	5	5.6
Lack of appropriate resting facilities around forty springs and hot springs	2	2.2	7	7.8	**28**	31.1	21	23.3	13	14.4	18	20	1	1.1
Difficulties of access roads to and within a park	10	11.1	18	20	26	28.9	11	12.2	30	33.3	10	11.1	1	1.1
Lack of modern swimming pool and toilet facilities	9	10	**21**	22.2	9	10	10	11.1	14	15.6	11	12.2	1	1.1
Lack of facilities like information provision , rented transportation means like mules, horses and bicycle, shops for materials and fast foods	**34**	37.8	9	10	9	10	6	6.7	13	14.4	4	4.4	15	16.7
Hot temperature	11	12.2	5	5.6	1	1.1	0	0	3	3.3	8	8.9	**62**	68.9

4.3. An Econometric Result of Choice Experiment

Nine efficient choice sets which were designed in fractional factorial method were used in eliciting information regarding tourists' preferences of ecosystem of the park. The nine choice sets were blocked into three parts and used in interviewing 210 tourists, 90 foreign and 120 domestic tourists were used randomly. Accordingly, 30 foreign and 40 domestic tourists faced three choice sets. From the two groups of tourists, foreign and domestic, 270 and 360 observations were used by using exact value and coded levels of the considered attributes.

For the attribute of afforestation the unit of measure of land coverage improvement was taken in hectares and each improvement levels were assigned in percentage of hectare, but percentage measures were changed into number of hectare using the status quo level of forest coverage of 2012 hectares. In this paper, high improvement level was 1509 hectare, and 1006 and 503 hectares were used as medium and low improvement levels respectively. Wildlife population attribute was coded as 1 and 2 for medium (75% increment population) and high (100% increment in population of wildlife) respectively. Additional services attributes were coded as 3, 2 and 1. Hence, 3 for high improvement level of services such as construction of roads to and within the park, hotels and lodges furnished with communicative facilities like Wi-Fi, fixed telephone on proper places within the park, information center, well trained additional scouts and tour guides and protected tourist zones, 2 for medium improvement level like provision of modern swimming and shower rooms, modern onsite toilets, resting benches, health and medical onsite treatments and shops and 1 for low level of improvement of services such as provision of campsite facilitated by tents, mattress, cooking gears, sleeping bags, renting onsite transportation means like bicycle, horses and mules in the park's environment respectively. The exact value of entrance fee as a cost attribute was used in

data set, so that 30 birr, 40 birr and 50 birr for domestic visitors and 100 birr, 110 birr and 120 birr for foreign visitors respectively for low, medium and high payment levels. For all attributes except entrance fee, the baseline levels were coded as zero in our data set. Limdep Nlogit 5 econometric software was used to estimate Multinomial logit and Random Parametric models. The estimates of the two models for both local and international visitors were provided and see at table 4.4, 4.5, 4.6, 4.7, 4.8 and 4.9 below.

4.3.1. Result of Multinomial Logit Model

Table 4.4 Results of multinomial logit model domestic visitors

Basic model (model 1)

Variables	Coefficients	Std. Er.	P[|Z|>z]
ASC	-0.36148	0.63625	0.5699
AFFR_A	0.00193***	0.00029	0.0000
WLP_A	0.52362**	0.24581	0.0332
ADSERV	0.64064***	0.12726	0.0000
ENTFEE	-0.06689***	0.01292	0.0000
Summary statistics			
Log-likelihood function	-211.3116		
Pseudo R^2	0.292		
Iteration completed	6		
Number of observation	360		
Number of respondents	120		

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

Table 4.4 above shows the result of the estimation of basic Multinomial logit model for domestic tourists. As shown by the above table, all coefficients of the attributes are statistically significant at 5% and 1% significance levels. Afforestation, additional services and entrance fee are significant at 1% of significance level and wildlife population is significant at 5%. The estimation result of all coefficients of attributes including cost coefficient are with expected signs. Thus, afforestation, wildlife population and additional services have positive signs implying that an increase in the levels of these attributes increase the probability of choosing improvement policy interferences that improve the levels of these attributes, keeping other things constant, so that increase the utility level of domestic tourists. In other expression, domestic tourists valued green area coverage, increment of both common and endemic animals like swine hartebeest, and provision of additional services like lodging and hoteling, communicative facilities, campsite facilities, construction of roads, onsite transportation means and etc. This finding is similar with the valuation studies such as Ali (2012) and Mesfin (2010) respectively at Semien Mountain National Park and Wondogenet wetland recreational area that shares some common attributes, Ethiopia.

The coefficient of entrance fee i.e. cost attributes is negative as expected. The negative sign of this coefficient explains, keeping other things constant, the higher the payment level in the improvement scenarios, the less it is preferred by the respondents. This is consistent with economic theory i.e. the economic theory of law of demand that explains the relationship between price and quantity demanded. This shows cost attribute decreases the indirect utility of the visitors. The sign of ASC (alternative specific constant) is negative, but it is insignificant statistically.

We included alternative specific constant in our model specification of indirect utility function though it is not common in unlabeled type of experiment. Because, including an ASC would violates the definition of unlabeled alternatives and that the right way to estimate the model with such design would be to exclude alternative specific constant for all generic (unlabeled) alternatives (Hensher et al., 2005). ASC plays the role of parameter of particular alternative representing the role of unobserved utility (Hoyos 2010). In fact, inclusion or exclusion of attributes of utility function in estimation of model has significant impact on the measured welfare level (Mogas et al., 2006). Studies excluding ASC are abundant in literature. However, excluding ASC in the process of model estimation results in biased parameter estimates of attributes, because the parameter of the included attributes would attempt to capture the effect of unobserved utility. Thus, it has been debated that inclusion of ASCs in the model estimation process is important to interpret the preference of the respondents (Morrison et al., 2002).

Table 4.5 Results of multinomial logit model for foreign visitors

Basic model (model 1)

Variables	Coefficients	Std. Er.	P[|Z|>z]
ASC	1.23007	0.92541	0.1838
ENTFEE	-0.06722***	0.01545	0.0000
AFFR_A	0.00195***	0.00037	0.0000
WLP_A	0.51170*	0.31194	0.1000
ADSERV	0.54544***	0.15484	0.0004
Summary statistics			
Log-likelihood function	-136.6372		

Pseudo R^2	0.2749
Iteration completed	8
Number of observation	270

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

In the same fashion tourists' preference of international tourists was estimated using Multinomial Logit Model and the econometric result of the model was shown in table 4.5 above. All coefficients are statistically significant at different levels of significance and with expected signs. Afforestation and additional services are with positive coefficients and significant at less than 1% of significance level and wildlife population attribute is statistically significant at 10% implying that an increase in the improvement levels of these attributes increases the probability of choosing improvement policy interferences by improving the levels of these attributes, keeping other things constant, so that increase the utility level of international visitors.

Entrance fee has negative coefficient and significant at less than 1% and kept consistency with microeconomic theory of law of demand. The coefficient of alternative specific constant has positive sign showing welfare improvement as movement from status quo to improvement levels but it is insignificant statistically.

The overall goodness of the estimated model is measured by the likelihood ratio index (LRI) (McFadden Pseudo R-squared). This statistic usually helps to measure how well the estimated model fit into the data nature of the Discrete Choice Experiments (DCEs). If the explanatory power of the estimated model is very low, the estimated model is not better than no model so that LRI (McFadden Pseudo-R^2) would takes the value of zero and the reverse would be true if the explanatory power of the estimated model is very high and LRI would takes value 1. As a rule of

thumb, well fitted models happen with the LRI lying between 0.2 and 0.4 and sometimes with rare conditions of the ratio greater than 0.4 (Henshere and Johnson, (1981); Hoyos, 2010). From the result of the two Multinomial Logit Models i.e., estimated models for both domestic and foreign visitors, the explanatory power of the two models measured in terms of McFadden Pseudo R^2 are 29.2% and 27.49% respectively for data of domestic and international visitors. The explanatory power of the two estimated models is almost the same.

The multinomial Logit Model assumes the independent of irrelevant (IIA) property. This property states that the relative probabilities of two options being chosen are not affected by the inclusion or exclusion of other alternatives. If this property is violated `then of MNL model would results in biased outcome and therefore, other discrete choice models that relax IIA assumptions such as Random Parametric logit (Revelt and Train, 1998; Train, 2003) should be in place. There is formal statistical test that can be used to test for violations of IIA property that was developed by Hausman and McFadden (1984). It is the most widely used tool of statistical test (Hanely et al, 2006; Birole et al 2006). Accordingly, the MNL model should not be used if IIA property is violated. When we come to our data set, the standard Hausman test could not be completed because the difference matrix was not positive definite. Hence, the Random Parameter Logit model was applied to our data set.

4.3.2. Result of Random Parameter Logit Model

We didn't estimated the extended form of the RPL model due to the same problem we faced in the estimation of an extended Multinomial Logit Model i.e. the problem of Hessian singularity in our data set when interacted with ASC or the attributes. Hence, we only estimated RPL model without interactions of the variables (basic RPL). In the estimation of Random Parameter Model standard Halton sequence was applied and 100 replications were used in the simulated draws.

Table 4.6 results of Random Parametric logit model for domestic visitors

variables	Coefficient	Std.Er.	P[|Z|>z]
Random parameters			
AFFR_A	0.00287***	0.00079	0.0003
WLP_A	0.53364*	0.30097	0.0762
ADSERV	0.90030***	0.23802	0.0002
Non-random parameter			
ASC	1.14527	1.20921	0.3436
ENTFEE	-0.10240***	0.02580	0.0001
Derived St.deviations of parameter distributions			
NsB_AFFR_A	0.00048	0.00168	0.7749
NsB_WLP_A	0.17609	0.41865	0.6740
NsB _ADSERV	1.29179***	0.49326	0.0080
Summary statistics			
Log-likelihood function	-207.8475		
McFadden Pseudo R^2	0.4745		
Significance level	0.0000		
Iteration completed	32		
Number of observation	360		

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

The result of the basic Random Parameter model estimation for domestic tourists' data set is presented in table 4.6 above. Accordingly, afforestation, additional services and entrance fee are

attributes which are significant at 1% level and with expected signs. Wildlife population is an attributes with positive sign as expected and significant at 10% level of significance. While ASC is positive in sign unlike the equivalent result of MNL model above and statistically insignificant implying that the levels of indirect utility of the visitors increase on average as they move from status quo level scenario to improvement scenarios but it is insignificant . The positive signs of afforestation, additional services and wildlife population show that the probability of choosing new plans increases as their respective levels improve. The direction of influence of all included attributes in estimation of RPL model parameter is the same with that MNL model for domestic tourists' data set except minor differences in level of significance.

In our RPL model parameter estimation result (see table 4.6) all attributes except ASC and entrance fee are specified as random. The parameter in MNL model is fixed (Vojacek and Pecakova, 2010) unlike that of the RPL model estimation of parameter which is the mean of parameter drawn over the number of replications from the chosen distribution. There are three additional variables in table 4.6 which is not available in case of MNL model result table of domestic tourists' data. These are derived standard deviation of parameter estimated. Derived standard deviation is (Vojacek and Pecakova, 2010) a parameter's distribution calculated over each of the number of draws and it shows degree of dispersion around the mean of parameter. Our RPL model estimation shows that the derived standard deviation of afforestation and wildlife population is insignificant that the dispersion of the respective parameter around its mean is zero i.e., it indicates that all information about domestic visitors' taste of these attributes is captured by the estimated mean. However, the case for additional services attribute is different and its derived standard deviation is significant at 1% level implying heterogeneity in the parameter estimate around its mean.

The log-likelihood function for RPL model estimated from domestic tourists' data is -207.8475 and it is nearest to zero. Furthermore, the McFadden Pseudo R^2 is 0.4745 and it is by far higher than that of MNL model. Hence, the model highly supports the data set.

Table 4.7 Results of Random Parametric logit model for foreign visitors

variables	Coefficient	Std.Er.	P[|Z|>z]
Random parameters			
AFFR_A	0.00261**	0.00107	0.0147
WLP_A	0.54919*	0.38162	0.0501
ADSERV	0.58035***	0.19401	0.0028
Non-random parameter			
ASC	2.56865	2.26253	0.2562
ENTFEE	-0.07160***	0.01906	0.0002
Derived St. Deviations of parameter distributions			
NsB_AFFR_A	0.00125	0.00113	0.2681
NsB_WLP_A	0.64464	0.88308	0.4654
NsB _ADSERV	0.60876	0.55533	0.2730
Summary statistics			
Log-likelihood function	-136.3567		
McFadden Pseudo R^2	0.5403		
Significance level	0.0000		
Iteration completed	22		
Number of observation	270		

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

The above table provides (table 4.7) the RPL model estimation of international tourists' choice experimental data set. As reported in the table, the attribute of additional services and entrance fee are significant at 1% level and their sign are positive and negative respectively for additional services and entrance fee attributes as priori expected. Afforestation and wildlife population attributes are significant at 5% and 10% levels respectively while their signs are positive. Like RPL model estimation of domestic tourists ASC in foreign tourist RPL model is positive and insignificant.

RPL model of domestic tourists has three derived standard deviation parameter for foreign tourists' data set. The derived standard deviations of all non-monetary attributes are statistically insignificant so that the dispersions of the parameters of these attributes around their means are zero.

The log-likelihood function of RPL model is -136.3567 is nearer to zero than that of domestic tourists' RPL estimation. Moreover, McFadden Pseudo R^2 is 0.5403 that it is the highest of all MNL models' estimates of domestic and foreign tourists above and RPL model estimation of domestic tourists' data set.

4.3.3. Estimation of Marginal Willingness to Pay

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

function, which can be used to calculate the mean willingness to pay estimates for each attributes (Birol and Koundouri, 2008). In simple linear model[8] WTP measures are calculated as the ratio of two parameter estimates, keeping other things constant. Implicit price refers to marginal willingness to pay for each improvement program. If at least one attribute is measured in monetary value, the ratio of the two parameters would give a financial indicator of WTP (Bennett, 1999; Hensher et al 2005).

In computing marginal WTP, (Henshere et al., 2005) it is important that the attributes to be used in the calculation have to be statistically significant, unless the calculated marginal willingness to pay would be misguiding.

The implicit prices of the three attributes considered in our case were estimated using equation (9) in chapter 3 above and reported in table 4.8 for both local and international visitors.

Table 4.8 Estimates of marginal willingness to pay in birr for domestic visitors

Variables	**Domestic visitor**		**Foreign visitors**	
	Coefficients (p-value)	Std. Er.	Coefficients (p-value)	Std.Er.
AFFR_A	5.21116** (0.0330)	3.46864	7.66986* (0.0850)	5.78681
WLP_A	8.79173*** (0.0001)	2.30027	8.10506** (0.0159)	3.36127
ADSERV	11.1840* (0.0665)	10.06416	35.8733* (0.0988)	27.91572

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

[8] ***as model of discrete choice are linear in utility functions, the choice modeler is able to take advantage of this fact***

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

Table 4.8 above shows the marginal willingness to pay for both domestic and foreign visitors. Each attributes is statistically significant at different level of significance. This shows that the visitors have positive willingness to pay for each improvement levels of the attributes in quality and quantity. WTP of afforestation and additional services attributes are significant at 10% whereas wildlife population attribute is significant at 5% for foreign visitors. For domestic visitors statistical significance of the attributes is at 5%, 1% and 10% respectively for afforestation, wildlife population and additional services. As it is reported on table 4.8 above, the marginal willingness to pay of local visitors for afforestation is 5.21116 birr per visit per individual keeping other things constant. This much payment is for each extra increment of one hectare Greenland coverage of the degraded area of the park from the status quo level. The marginal willingness to pay (MWTP) of the local tourists for every additional increment of wildlife population and additional services levels are valued to be 8.79173 birr and 11.1840 birr per visit per individual respectively keeping other factors unchanged. From these values, local visitors' MWTP for every additional service is higher than that of afforestation and wildlife population, and in turn MWTP of wildlife population is higher than that of afforestation, ceteris paribus. Hence, these visitors valued additional services first, and wildlife population and afforestation second and third respectively.

International visitors' MWTP for every extra one hectare increment of afforestation level from status quo/current situation is 7.66986 birr per visit per individual keeping other things constant.

The MWTP of this tourist group for every incremental level of additional services was computed to be 35.8733 birr per visit per individual and 8.10506 birr per visit per individual for additional level of wildlife population keeping other factors unchanged. When we deduce from the MWTP value of sampled foreign visitors, additional services attribute is highly valued compared with other attributes. Wildlife population and afforestation attributes were given second and third places in valuation. Furthermore, tourists', both local and international tourists', attention is consistent in terms of monetizing the attributes.

4.3.4. Estimation of the Compensating Surplus

The marginal willingness to pay reported in table 4.9 does not give estimates of compensated surplus for the alternative improvement scenarios. In order to compute the visitors' CS for improvement in the Park's alternative management scenarios over the status quo option; Hence, three possible options were formed as follow.

Current situation/Status quo levels

- No increment of forest land coverage
- Very low level of wildlife population and
- Very limited services provision like maps, library/museum, and campsite with limited facilities, traditional swimming pools filled with mud, limited number of tour guides and scouts and, harsh and difficult roads to and within the park.

Scenario 1 (low impact improvement scenario)

- expanding forest land coverage by 503 hectare (25% of the present level)
- increasing the number of wildlife by 75%

- Provision of only limited services like camp sites furnished with tents, mattress, sleeping bags and cooking gears, renting onsite transportation means like **bicycle, horses** and **mules**.

Scenario 2 (medium impact improvement scenario)

- expanding forest land coverage by 1006 hectare (50% of the present level)
- , increasing the number of wildlife by 100%
- Provision of modern swimming and shower rooms, **modern onsite toilets**, **resting benches**, **health and medical onsite treatments** and **shop**s.

Scenario 3 (high impact improvement scenario)

- expanding forest land coverage by 1509 hectare (75% of the present level)
- increasing the number of wildlife by 100%
- Construction of well accessible roads to and within the park, **construction of onsite hotels and lodges** furnished with communicative facilities like **Wi-Fi** and **fixed telephone** on proper places within the park**, information center, well trained additional scouts and tour guides, protected tourist zone.**

Table 4.9 Compensating surplus for both domestic and foreign visitors

		Mean WTP per visit in birr (US $)	
Alternative improvement Scenarios		Local visitors	Foreign visitors
Improvement scenario 1		2641.19(136.07)	3873.28(2601.16)
Improvement scenario 2		5273.57(252.57)	8178(391.67)
Improvement scenario 3		7914.78(379.06)	54312.18(185.5)
Attr. Levels			
	AFFR_A	WLP_A	ADSERV
Status quo	*0*	0	0
Scenario 1	*503*	1	1
Scenario 2	*1006*	1	2
Scenario 3	*1509*	2	3

Source: estimated from own data

Consumers surplus (CS) was calculated using equation (10) explained in methodology part of chapter of the paper.

Using the implicit price computed from RPL model, the model with better fit, and the levels of each attributes compensate surplus (improvement in welfare level) of both domestic and international visitors for each proposed scenarios were calculated. Accordingly, the mean willingness to pay for high impact improvement scenario (scenario 3) is 7,914.78 birr (US $379.06) for local visitors and 54,312.18 birr (US $2601.16) for international visitors per visit per individual whereas the mean WTP for medium impact improvement scenario (scenario 2) is computed to be 5,273.57 birr (US $252.57) and 8,178 birr (US $391.67) per visit per individual respectively for domestic tourists and international tourists from the status quo situation. Finally

the mean WTP for the low impact improvement scenario (scenario1) is calculated as 2841.19 birr (US $136.07) for domestic visitors and 3873.28 birr (US $185.5) for international visitors per visit per individual from the status quo condition. Comparing these result with what Zewdu and Yemserach (2004) found using Dichotomous Contingent Valuation Method, the mean willingness to pay of the visitors is by further greater than the mean willingness to pay of the households for improvement plan. As of the study of Zewdu and Yemserach (2004), the mean willingness to pays of the households for general improvement of the ecosystem of the Park was 28.34 birr and 57.07 birr per year per households.

Using the mean willingness to pay levels at different proposed improvement scenarios, the welfare levels for both groups of tourists are seen to be consistent across all attributes as that of marginal willingness to pay for each attributes explained above. Moreover, it is possible to compute the annual overall economic benefit (value) of the park in terms of welfare improvement of the visitors from baseline scenario for each hypothetical improvement scenarios. For example, for high impact improvement scenario (scenario 3) total WTP is calculated to be 112,025,796 birr (US $5,365,220.11) for domestic visitors and 637,081,871 birr (US $30,511,583.9) for foreign tourists per year. The overall annual WTP for both groups of visitors is summed up to be 749,107,667 birr (US $ 35,876,804).

4.3.5. Results of the Follow-up Questions

All respondents were asked the reason why they choice the choice set presented in a choice set card as a follow up questions and answered them. The follow up questions' result for both foreign and domestic tourists were summarized by table 4.10 below.

Table 4.10: Follow-up questions

	Follow up questions	Foreign visitors		Domestic visitors	
		Freq.	%	Freq.	%
1	I choice the status quo option because of an objection to the amount to the amount of entrance fee.	1	1.11	1	0.83
2	I understood that afforestation attribute is important and that I gave priority for choosing the highest level of this attribute.	27	30	25	20.83
3	I chose the cheapest option whatever its level is.	-	-	-	-
4	I understood that wildlife population attribute is important and that I gave priority for choosing the highest level of this attribute.	29	32.22	44	36.67
5	I understood that additional services attribute is important and that I gave priority for choosing the highest level of this attribute.	33	36.67	50	41.67
6	I agree to pay in order to experience a worm-glow of supporting a good cause	-	-	-	-
Total respondents		**90**	**100**	**120**	**100**

Source: calculated from own survey

As summarized in table 4.10 above, 33 respondents (36.67%) of foreign respondent and 50 respondents (41.67%) of domestic visitors prioritized enhancement and improvement levels of additional services in ecosystem area of the park, whereas 29 individuals (32.22%) of foreign tourists and 44 respondents (36.67%) of domestic tourists replied as they gave priority for the conservation of wildlife population. About 27 (30%) international tourists and 25(20.83%) of local tourists gave top priority for an increment of forest area coverage. The remaining (about 1.11% of foreign visitors and 0.83 of local visitors) chose status quo level as objection of the imposed level of entrance fee for the hypothetical improvement plans. From this survey result we can deduce that the insight of both international and domestic tourists regarding the selected attributes in the park's ecosystem is consistence with each other as well as with the econometric result of choice experiment.

CHAPTER FIVE

CONCLUSION AND RECOMMENDATION

4.4.Conclusion

NNP is one of the tourist attraction sites in the country due to its scenic land features, richness in diversified fauna and flora with some endemic mammals and birds. It was established in 1974 in the Southern Nation Nationality and Peoples of Ethiopia that is located 500kms to the south of Addis Ababa, near Arba Minch town following UNSCO's mission of proposals of establishing notational parks in Ethiopia. However, this rich ecosystem was endangered due to human encroachment. This is a result of a rapid expansion of Arba Minch town, the formation of state farms which was privatized latter on, establishment of various institutions, immigrants of the Gamo highlands and residents of the Arba Minch town demanding forest production. Furthermore, invasion of the park by the nearby Guji pastoralist and Kore agro-pastoralist community and illegal hunting of wildlife in the park were major problems that hindered the ecosystem as a whole and especially the grassland plain that serves as habitat of endemic mammals, Swayne hartebeest, and other common wildlife. If the current conditions continue in such way the local community would lose any benefit that they would get from the ecosystem service of the natural area and the influx of tourists from various corners of the world.

To know the monetary value of Nechisar National Park, Choice experiment technique was applied using primary data collected by interviewing 210 visitors. Of these, 120 were domestic and 90 foreign visitors. Choice experimental model was used to elicit tourists' preferences for improvements of the park's ecosystem through willingness to pay for attributes such as afforestation, wildlife population and additional services using entrance fee as a vehicle of

payment. Multinomial and Random parameter logit model were used for the estimation. The marginal WTP calculated from RPL model for each attribute were approximately 5.2, 8.79, 11.2 in birr for domestic visitors and 7.7, 8.11, 35.87 in birr for foreign visitors per visit per individual respectively for afforestation, wildlife population and additional services. Hence, tourists' order of preference was additional services, wildlife population and afforestation for both local and foreign tourists. In the meantime, compensating surplus for three improvement scenarios (low, medium and high) were estimated. Hence, the total economic value of the park in terms of welfare estimation from high impact scenario was summed up to be 749,107,667 birr (US $ 35,876,804).

4.5.Policy Recommendation

The results from choice experiment modeling imply that the park has significant economic and welfare improvement role. This implies that the authority needs the level of investment amount to increase improvements of the attributes in quality, quantity and types that attracts tourist inflows both domestically and internationally.

Wildlife population is one of the attributes that affects the welfare level of the visitors positively. Hence it needs focus from conservation point of view. To increase the frequency of wildlife to be seen by tourists, the two major administrative bodies of the park (Ethiopian Wildlife Authority and Nechisar national Park Administration office) have to work together on increasing the number of wildlife in the park. This will be made possible through creating secured ecotourism area so that there will be no competition among wildlife and cattle for grazing and no more illegal hunting of endemic mammals as hostile attitude of nearby communities feeling as they deprived of their grazing land for the sack of wildlife conservation. In the meantime, increasing

green area coverage through well planned and sustainable afforestation program has to be designed by concerned authorities.

On the other hand, fulfilling additional facilities required by tourists like community lodges and hotels, modern swimming pools, shops, means of transportation within the park, communication facilities (Wi-Fi internet services, fixed telephone and network access for mobile phone) and other facilities proposed within this thesis work needs to be prior attention. Given all these facilities on proper places and required manner the quality of the park matches the required standard and remains as a horizon of tourist destination.

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APPENDIX A

QUESTIONNAIRE

ADDIS ABABA UNIVERSITY

DEPARTMENT OF ECONOMICS

CHOICE EXPERIMENT SURVEY QUESTIONNAIRE FOR ESTIMATING THE ECONOMIC VALUE OF NECHISAR NATIONAL PARK

Interviewer's name: _____ **Date of interview: _____**

Starting time: _____ **Ending time: _____**

Code number of the interview: _____ supervisor's name: _____

Thank you in advance being you shared me your precious time. My name is Adugna Eticha, M.Sc. Student at Addis Ababa University. Currently I am undertaking my thesis in partial fulfillment of degree of masters of Science in economics (resource and environmental economics). The thesis is aimed at estimating the value and improvement of the ecosystem area of Nechisar National Park. Dear respondent, you are randomly selected to be asked onsite information, your perception and general observation about the park. Please provide your answers for the given questions. The information will help government and other concerning bodies to make important policy decision for developing sustainable use and conservation of the ecosystem area of the park.

I. Demographic Characteristics of the Respondent

1. Gender of the visitor. i. Male ii. Female
2. Age of the visitor. _____Years.

3. Marital status: i. Single ii. Married iii. Separated/divorced iv. Other (e.g. cohabitation without marriage) please specify_____
4. Family size_____(No. of family member)

   No. of adults (age ≥ 18 years)_____No. of children (age <18 years) ____
5. Years of attendance of formal education_____(in years completed)
6. Occupation: i. Public sector employee ii. Private sector employee iii. NGO iv. International organization v. own business vi. Student vii. Unemployed viii. Other (please specify _____)
7. What is your personal disposable monthly income _____in currency i. USA dollar **ii**. Euro **iii.** Birr **iv**. Pound **v**. Other (please specify_____).
8. How many people in your family (including yourself) earn their own income? (either from employment or business or other activities) _____and what is their gross income? _____
9. Nationality: 1. Ethiopian National 2. Foreign National (specify _____)

II: CHOICE EXPERIMENT SCENARIOS

The primary focus of the choice experiment in this thesis work is to give description about the choice profile that shows tourists' preferences in the park's ecosystem area. The preferences of tourists will be investigated for different measures that will affect environmental quality of the park. The measures that will be expected to affect the recreational quality of the park will be examined in terms of afforestation of the degraded area, conservation of wildlife and provision of additional tourist facilities. The respondents will be asked to give attention for the park's

attributes under focus and the costs of undertaking different measures in choice sets provided below. The cost of improvement of the attributes of the park's ecosystem in this case is visitors' entrance fee. Here I do not expect "correct" or "wrong" answer for the given choices. What is required is your perception for various options given in the choice sets and you are asked to choose your best options. Dear respondents please give attention for the attributes: afforestation, wildlife and addition of services and they are independent of each other. Please tick the both below the alternative of your best choice. In case you want to change your previous answer please do not make hesitation, and feel free to change your answer.

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

There are three basic areas in which the above two stakeholders plan to give considerable improvement and quality enhancement of the park's ecosystem.

1. **Afforestation: -** This program aimed towards planting new native trees on the degraded areas and covering surrounding landscapes which were changed to bush land and covered by invasive plants that the areal coverage of the forest will be able to harbor all biodiversity within the park. The program will play a paramount role in reversing problematic ecosystem services such as water flow variability of forty springs that affects Arba Minch town water supply, the downstream resources i.e. the crocodile, hippopotamus and fishery resources in Lake Chamo and carbon sequestration process of forest. Furthermore, the park's panoramic views will enhance good recreational quality of the ecosystem of the park and high tourists' inflow will be the end results.

2. **Wildlife population: -** This will give special focus in increasing the number of both endemic and other common wildlife in the park. Management zones will be developed within the park; creation of core protection area of wild animals and buffer zone in which pastoralists and agro pastoralists carry out their respective livelihood. In such away the opportunity cost of wildlife conservation is insignificant that the returns to wildlife tourism will be attractive. Therefore, increasing the number of endangered and other common wildlife will be unquestionable policy option
3. **Additional services: -** Nechisar National Park is one of naturally enriched protected area harboring diversified flora and fauna species, panoramic land view located between the two lakes i.e. Abaya and Chamo. Having all these charming elements, the surrounding community and the park administration were not able to exploit the existing opportunity by absorbing potential tourist flows. Because the park lacked well qualified facilities demanded by tourists while moving to and recreating within the park. When tourists move to the park, roads to the park and within the park is harsh and make the trip inconvenient and make tourists less attractive to visit the park's environment. Another challenge is the absence of facilities such as toilets, showers rooms, shops, recreational benches in the park, modern swimming pools, camping equipment such as tents, sleeping bags, mattress and cooking gears, information provision center, health center and medical treatment, enough and well trained tour guides and scouts, renting a kind of transportation like motor bike, bicycle and traditional transportation like mules and horses. On visiting the park, lack of breath taking places like provision of community based lodges, hotels for visitors to stay in the park. Therefore, most visitors were stay overnights at Arba Minch town which is very costly and especially unaffordable for domestic visitors. Therefore, to make park very conducive and

attractive recreational site all the above mentioned lacked additional facilities should be provided at proper places, especially constructing modern shower rooms, shops, toilets, furnishing lodges and hotels by wireless internet services (Wi-Fi), modern swimming pools, fixed telephone at proper places is important. Thus, Nechisar National Park will be a corridor of tourist destination at the end of the day.

However, to make these plans realistic the program need strong source of finance. Thus, the immediate concerning bodies will need to have appropriate mechanism of financing the program to implement the plans. Hence, the present entrance fee of the visitors should be changed to secure significant amount of money, thus visitors should pay entrance fee greater than the present one. Finally, the collect money in a form of entrance fee will be able partially finance the cost of conducting the proposed plans.

Assume that the program will be undertaken; money will be spent to improve the recreational quality of the site and sustainable conservation of the natural ecosystem of the park will be conducted in terms of afforestation of the degraded land features of the park, increasing wildlife population of both endemic endangered and common wild animals of those assumed to have significant tourism effect and conservation mechanism applied to them will have positive spillover effect on the remaining wildlife in the park, and provision of additional facilities.

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

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

Attributes	**Plan 1**	**Plan 2**	**Plan 3 (status quo)**
Afforestation	Expanding forest coverage by 25%	Expanding forest coverage by 50%	No increment of forest coverage **(2012 hectares**)
Wildlife	**High**, increasing the number of wildlife by 100%	**Medium**, increasing the number of wildlife to medium level by 75%	**Low**, (for status quo level the number of representative[1] wildlife were taken)
Additional services	Construction of well accessible roads to and within the park, and other facilities[2]	Provision of camp sites furnished with tents, mattress, sleeping bags and cooking gears and other facilities[4]	status quo level[5]
Entrance fee	30 birr	50 birr	**20 birr**
I prefer (please tick in the box)	☐	☐	☐

[1] the representative wildlife are those including the endemic and the critically endangered animal, Swayne's Hartebeest, and other those assumed to have significant tourism effect and the conservation mechanism applied for them will have positive spillover effect for the remaining wildlife in the Park. Name of animals with their respective number of status quo level in bracket: Swayne's Harte beest (2), Buchell's Zebra (2193), Grant's gazelle (1019), Greater kudu (98), Lesser kudu (27), Common bushbuck (158), Columbus monkey (67), Anubis baboon (258), Common warthog (114), Guanter'sdikdik (46), Waterback (284).

[2] including **construction of onsite hotels and lodges** furnished with communicative facilities like **Wi-Fi** and **fixed telephone** on proper places within the park**, information center, well trained additional scouts and tour guides, protected tourist zone.**

[3]including **modern onsite toilets**, **resting benches**, **health and medical onsite treatments** and **shop**s

[4]including renting onsite transportation means like **bicycle, motor bikes, horses** and **mules**.

[5] present level of services provision like maps, library/museum, and campsite with limited facilities, traditional swimming pools, limited number of tour guides and scouts and, harsh and difficult roads to and within the park.

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

Attributes	Plan 1	Plan 2	Plan 3
Afforestation	Expanding forest coverage by 75%	Expanding forest coverage by 25%	No increment of forest coverage **(2012 hectares**)
Wildlife	**High**, increasing the number of wildlife by 100%	**Medium**, increasing the number of wildlife to medium level by 50%	**Low**, (for status quo level the number of representative[1] wildlife were taken)
Additional services	Provision of modern swimming and shower rooms and other facilities[3]	Construction of well accessible roads to and within the park, and other facilities[2]	status quo level[5]
Entrance fee	50 birr	40 birr	20 birr
I prefer (please tick in the box)	☐	☐	☐

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

Attributes	Plan 1	Plan 2	Plan 3
Afforestation	Expanding forest coverage by 50%	Expanding forest coverage by 75%	No increment of forest coverage **(2012 hectares**)
Wildlife	**medium**, increasing the number of wildlife by 50%	**high**, increasing the number of wildlife to medium level by 100%	**Low**, (for status quo level the number of representative[1] wildlife were taken)
Additional services	Construction of well accessible roads to and within the park, and other facilities[2]	Provision of camp sites furnished with tents, mattress, sleeping bags and cooking gears and other facilities[4]	status quo level[5]
Entrance fee	50 birr	40 birr	20 birr

I prefer (please tick in the box)	☐	☐	☐

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

Attributes	Plan 1	Plan 2	Plan 3
Afforestation	Expanding forest coverage by 50%	Expanding forest coverage by 75%	No increment of forest coverage **(2012 hectares**)
Wildlife	**medium**, increasing the number of wildlife by 50%	**high**, increasing the number of wildlife to medium level by 100%	**Low**, (for status quo level the number of representative[1] wildlife were taken)
Additional services	Provision of modern swimming and shower rooms and other facilities[3]	Construction of well accessible roads to and within the park, and other facilities[2]	status quo level[5]
Entrance fee	40 birr	50 birr	20 birr
I prefer (please tick in the box)	☐	☐	☐

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

Attributes	Plan 1	Plan 2	Plan 3
Afforestation	Expanding forest coverage by 50%	Expanding forest coverage by 25%	No increment of forest coverage **(2012 hectares**)
Wildlife	**high**, increasing the number of wildlife by 100%	**medium**, increasing the number of wildlife to medium level by 75%	**Low**, (for status quo level the number of representative[1] wildlife were taken)
Additional services	Construction of well accessible roads to and within the park, and other facilities[2]	Provision of modern swimming and shower rooms and other facilities[3]	status quo level[5]

Entrance fee	30 birr	40 birr	20 birr
I prefer (please tick in the box)	☐	☐	☐

Choice set 6: Which plan would you choose for Nechisar National Park ecosystem area?

Attributes	Plan 1	Plan 2	Plan 3
Afforestation	Expanding forest coverage by 25%	Expanding forest coverage by 50%	No increment of forest coverage **(2012 hectares**)
Wildlife	**medium**, increasing the number of wildlife by 75%	**high**, increasing the number of wildlife to medium level by 100%	**Low**, (for status quo level the number of representative[1] wildlife were taken)
Additional services	Provision of camp sites furnished with tents, mattress, sleeping bags and cooking gears and other facilities[4]	Provision of modern swimming and shower rooms and other facilities[3]	status quo level[5]
Entrance fee	50 birr	40 birr	20 birr
I prefer (please tick in the box)	☐	☐	☐

Choice set 7: Which plan would you choose for Nechisar National Park ecosystem area?

Attributes	Plan 1	Plan 2	Plan 3
Afforestation	Expanding forest coverage by 25%	Expanding forest coverage by 100%	No increment of forest coverage **(2012 hectares**)
Wildlife	**high**, increasing the number of wildlife by 100%	**medium**, increasing the number of wildlife to medium level by 75%	**Low**, (for status quo level the number of representative[1] wildlife were taken)

Additional services	Provision of camp sites furnished with tents, mattress, sleeping bags and cooking gears and other facilities[4]	Construction of well accessible roads to and within the park, and other facilities[2]	status quo level[5]
Entrance fee	30 birr	40 birr	20 birr
I prefer (please tick in the box)	☐	☐	☐

Choice set 8: Which plan would you choose for Nechisar National Park ecosystem area?

Attributes	Plan 1	Plan 2	Plan 3
Afforestation	Expanding forest coverage by 25%	Expanding forest coverage by 50%	No increment of forest coverage **(2012 hectares**)
Wildlife	**medium**, increasing the number of wildlife by 75%	**high**, increasing the number of wildlife to medium level by 100%	**Low**, (for status quo level the number of representative[1] wildlife were taken)
Additional services	Provision of camp sites furnished with tents, mattress, sleeping bags and cooking gears and other facilities[4]	Provision of modern swimming and shower rooms and other facilities[3]	status quo level[5]
Entrance fee	50 birr	40 birr	20 birr
I prefer (please tick in the box)	☐	☐	☐

Choice set 9: Which plan would you choose for Nechisar National Park ecosystem area?

Attributes	Plan 1	Plan 2	Plan 3
Afforestation	Expanding forest coverage by 25%	Expanding forest coverage by 75%	No increment of forest coverage **(2012 hectares**)
Wildlife	**high**, increasing the number of wildlife by 100%	**medium**, increasing the number of wildlife to medium level by 75%	**Low**, (for status quo level the number of representative[1] wildlife were taken)
Additional services	Provision of modern swimming and shower rooms and other facilities[3]	Provision of camp sites furnished with tents, mattress, sleeping bags and cooking gears and other facilities[4]	status quo level[5]
Entrance fee	50 birr	30 birr	20 birr
I prefer (please tick in the box)	☐	☐	☐

III. Follow -up questions

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

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

VI. Observation of Nechisar National Park

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

A. Forest and landscape degradation of the area. ____

B. Lack of protected tourist zone._____

C. Lack of appropriate resting facilities around forty springs and hot springs. ___

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

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

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

G. Severely hot temperature. _____

THANK YOU FOR YOUR COOPERATION!!

Appendix B
Exchange rate in Ethiopian birr

Currency	birr
USA Dollar	20.88
British Pound	32.68
Euro	23.2