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SCHOOL OF GRADUATE STUDIES

ESTIMATING THE ECONOMIC VALUE OF WILDLIFE:

THE CASE OF ADDIS ABABA LIONS ZOO PARK

BY

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ACRONYMS

CBA Cost-Benefit Analysis

CS Consumer Surplus

CVM Contingent Valuation Method

DBDC Double Bounded Dichotomous Choice Formats.

ETB Ethiopian Birr

ITCM Individual Travel Cost Model

RSW Relationship with wildlife as dummy variable

SBDC Single Bounded Dichotomous Choice Formats

SUBPM Seemingly Unrelated Bivarite Probit Model

Sup The number of people that the respondent supports

TCM Travel Cost Method

TEV Total Economic Value

TPM Truncated Poisson Model

WTA Willing-To-Accept

WTP Willingness To Pay

ZTCM Zonal Travel Cost Method

ABSTRACT

Environmental and natural resources such as air, water, forests and wild animals give many advantages to human beings. However, the absence of market for these resources negatively affects the well-being of human beings by reducing the benefits that can be generated from these resources. In this case, economic valuation method helps to find the price or economic values attached to natural resources. Therefore, the proper valuation of non-market environmental commodities such as viewing wildlife has significant policy implications.

The main purpose of this study is to estimate the total economic value of Addis Ababa Zoo Park using environmental economic tools. This study used the Individual Travel Cost Method (ITCM) on 158 on-site visitors, to estimate the value of viewing wildlife of Addis Zoo Park and the Double Dichotomous Contingent Valuation Method (DDCVM) on 90 respondents to investigate the mean WTP for the non use value of the park. The study used seemingly unrelated bivarite probit model to derive the demand function for the recreational use value of wildlife and truncated probit model to estimate the non use value contribution of wildlife. The regression result showed that travel cost, monthly income and SUP are important determinants of the recreational demand of the site. On the other hand the first bid price, monthly income, RSW and age are important determinant of willingness to pay for the non use value part of wildlife. The result of the study also showed that the potential annual use value of the park was estimated to be 11, 767,287 ETB per annum and the annual non use value of the wildlife is 17,160,634 ETB. Therefore, the annual total economic value of the park is approximately 22.5 times higher than the current revenue. Results of this study are very important to assist policy makers especially in revenue generation. This information can be used to estimate the benefits of further investment of the park, to price this site according to demand if there are budget limits, and in particular to invest in the protection of threatened wildlife.

***Key Words**: Contingent valuation method, Travel cost method, Willingness to pay, Consumer surplus, Use value, non use value*

CHAPTER ONE

INTRODUCTION

1.1. Statement of the Problem

Natural resources such as forests and commercially exploitable fisheries and environmental attributes such as air quality are valuable assets in that they yield flows of services to people. The natural resource-environment complex can be viewed as producing four kinds of service flows to the economy. First, the resource-environment system serve as a source of material input to the economy such as fossil fuel, wood products, minerals, water and fish. Second, some components of the resource-environment system provide life-support service in the form of breathable atmosphere and a livable climate regime. Third, this system disperses, transforms and stores the residuals that are generated as by-products of economic- activity. Finally, the resource-environment system provides a wide Variety of amenity services, including opportunity for recreation, wildlife observation, the pleasure of scenic views, and perhaps even services that are not related to any direct use of the environment (Freeman III, 1993).

Natural and environmental resources provide a complex set of values to individuals and benefits to society. Protected areas, for example, offer scenic panoramas and radiant sunsets, exhilaration of white-water canoeing, the total serenity of wilderness trek, educational value and spiritual value. There are different types of protected areas which are designed to give different services to the public: National parks, Zoo parks, Cultural and Historical parks, Scenic or Natural parks, Amusement parks, Children parks, Sport Parks, Botanical gardens and Nurseries'

are some of them. Both National parks and Zoological parks are mainly used for protecting Wildlife but they are different. In the national parks or sanctuaries wildlife lives within a natural forest and there is no limitation on their movement from place to place within the park in search of food. On the other hand, since zoological parks are mostly found in towns, wildlife' are forced to be incarcerated and dependent on humans for survival. Zoological parks are useful in protecting wildlife from danger, and increasing their number through breeding. Besides, zoos are also important for research and education purposes and creating wildlife conservation awareness to the public.

Zoological parks and Botanical gardens have other advantages beside their primary activity of preserving and conserving wildlife. First, they serve as sources of income. For example, bird watching or birding in North America contributes more than $20 billion each year (Fish, 1982). Second, they create job opportunities for the local community. Third, establishment of zoos and botanical gardens motivate other investments such as gas stations, hotels and parking services in the neighborhood. Finally, wildlife in zoological parks are mostly endemic plants and animals which are likely to have high non use value to the future generation in climate modeling and environmental scenic.[1]

Despite all these benefits derived from recreational areas, the conservation activities done by the recreational authorities and the society's contribution are limited. A majority of people in developing countries would like a better natural environment, less air pollution, more peace and quiet, cleaner beaches, more nature reserves and greener electricity production. Unfortunately, those same people also need better roads and railways, more new homes to be built and low

[1] Wildlife especially plants have great contribution in Climate modeling

taxes to pay. Besides, many human activities are competing with the environment; for example, an increasing demand for agricultural land due to population growth put pressure on wildlife; an increase in number of industries results in water, noise and air pollution. Nevertheless, most people are not willing to compensate for the loss of environmental resources and even, if people are willing to pay for the benefit they derive from environmental services, getting the appropriate price for environmental resources is a bit difficult due to the absence of market. It is the failure of the market system to allocate and price resources and environmental services correctly that create the need for economic measures of values to guide policymaking.

The problem of finding the price or economic values attached to a natural resource and environment can be solved by adopting an appropriate method of valuation. Valuation is concerned with the analysis of methods for obtaining empirical estimates of environmental values, such as the benefits of improved river water quality, or the cost of losing an area of wilderness to development.

Nowadays economic valuation is applied in many developed countries in the area of environmental and natural resources such as air and water quality improvement, on wildlife conservation and protected areas services. But the application of environmental valuation is not developed in Ethiopia like other developing countries and much work has not been done before.

Although Ethiopia is among the world leaders in terms of richness and endemism of mammalian species, the economic values of these resources are still unknown. Because of the absence of market for these resources, their economic contribution to the development of the economy is under valuated. This has affected the sector negatively through the limited

conservation activities done by the responsible body. The wild life population in Ethiopia has diminished over the last century, both in amount and distribution through hunting and land clearance for farming. Land degradation due to overgrazing is also intense (Groombridge, 1992).

To ensure the sustainability of the contribution of wildlife to the national economy the following questions must be addressed. First, is there any legally administered wildlife protected areas in the country? The answer is yes. National parks and sanctuaries, and Zoological parks are the two main types of protected areas used for preserving wild life in Ethiopia. There are a number of national parks and sanctuaries in Ethiopia. These include, Bale Mountains National Park, Semien Mountains National Park, Abiyatta Lakes National Park and Gambella National Park. However, Zoological parks in Ethiopia are limited in numbers which are found only in Addis Ababa and in Haromaya University. The second question is what is the current contribution of wildlife to the economy? What is the benefit of having wildlife protecting areas? This question can be answered by the application of economic valuation studies.

This study focuses on the total economic value of wildlife at Addis Ababa lions' zoo park. Within this zoo, there are animals such as lions and Gelada Baboon and plants. The lions are found only in this zoo. Addis Ababa lion's zoo is selected for this study basically for the following reasons:

First, Addis Ababa, where the park is located, is not only the administrative centre but also the economic and social nerve-center for Ethiopia and an administrative and political center for Africa. There are also a number of monuments, mausoleums, museums and parks. Merkato

market, the biggest open market in Africa is also situated in the city. So the Addis Ababa lion's zoo park is a potential tourist destination in the city and has a potential to generate high income and support for the tourism sector if appropriate valuation is employed. However, to the best of the knowledge of the researcher no valuation research was conducted before this study on Addis Ababa lion Zoo Park.

Second, unlike past studies on recreational sites in Ethiopia which focused only on use value of recreational sites, this study acknowledges the non use value of wildlife as well. As Rietbergen (1998) noted, if a given recreational site has something different that makes it unique among other sites or if there are endemic wild life, the non use value of that specific site is expected to be high and larger than its use value. The research conducted by Melaku (2002) shows that the lions in Addis Ababa zoo park (Panther Leo Abyssinica) are the only traits in the world and this zoo is the only wild life protecting area in Addis Ababa, which makes it unique.[2] So ignorance of the nonuse value of wildlife will under estimate its true value which may have a negative effect on the effort of protecting endangered wildlife within the park. This research contributes by estimating the non use value of protecting wild life.

Third, a major obstacle to Park management has been the failure of macro-economic planners in budget allocations. The budget allocation of Addis Ababa city council in 2010 shows that, the annual budget for this zoo is only $64,000. Excluding other expenses, $72,423 is needed per year to feed all lions.[3] Because of the budget deficit, when the zoo gets over-populated, they

[2] There are three subspecies of lions in Ethiopia, namely P. l. nubica, P. l. massaicus and P. l. somaliensis (Melaku,2002)

[3] To feed one lion 6 - 8 kg meet is needed per day and in monetary term which is estimated around $201 per day to feed all lions.

send the lions to taxidermists. It is worth noting again that these lions are the only trait in the world. A cost-benefit analysis is thus needed to help in coming up with a sound design of policy especially in budget allocation. This study contributes by estimating the true value of the park.

Fourth, park fees represent the most accessible market mechanism to finance revenue sharing. Parks not only generate local economic benefits, but they also typically yield considerable off-site benefits. Pearce (1997) examines the recreational value of parks in Africa and argues that the levels at which park entry fees are set undervalue wildlife because they fail to maximise income or fully capture tourist willingness to pay. The entrance fee to Addis Zoo Park is $0.125. It is, however, not possible to conclude that it is the maximum consumer willingness to pay for the park without valuation. So this study tries to find the optimum level of this park fee or the level to which prices should be raised in order to capture more of this tourist consumer surplus, which may directly help macro-economic planners to acknowledge the true economic values of parks.

Fifth, zoological parks have not been given much attention in Ethiopia as evidenced by their number and the service they provide currently .[4] Even the existing Addis Abba Lions zoo park fails to maintain its main task of conserving wildlife. Many lions are in risk of extinction due to diseases and starvation. Mortality rate of newborns was 50% in 2002, which was due to starvation from mis-mothering. The most severe infection diseases of lions are Canine distemper and Feline leukemia (Melaku, 2002). Addis Ababa zoo is located near resident quarters. The pet dogs and cats kept within these residential quarters risk contracting these diseases. A sustainable wildlife conservation system, protection of the existing and coming up

[4] There are only two zoological parks; in Addis Ababa (Addis Ababa zoo park) and in Haromaya University

with other zoos are therefore necessary measures. But, to implement them, information on their market values is needed. Why should we care for endangered animals? Do they have nonuse value to the society? What benefits are derived from establishing new zoological gardens? Does it add a positive value to the wellbeing of human being directly or indirectly? To answer all these questions, information on valuation is highly demanded. Hence this study is in response to this information gap.

1.2. Objectives of the Study

The general objective of the study is to examine and recognize the total economic value of wildlife at Addis Ababa lions zoo Park and its contributions to national economic activity.

The specific objectives include;

- Determining consumer willingness to pay for viewing and conserving wildlife
- Determining the optimum entrance fee to the park
- Assessing the socio-economic and demographic characteristics that influence society's willingness to pay for use value and non use value of conserving wildlife
- Based on the findings, the study forwards policy implications toward the use and conservation of zoological parks.

1.3. Significance of the Study

This study will have significant contributions in the following areas. First, traditional economic approaches, which consider only the extractive use component of the resources and the earning from tourism, have not only undervalued protected areas; they have also had serious negative

implications for park management. Extractive resource use and tourism are not the primary purposes of most zoological parks. Their main function is the conservation of wild species and natural ecosystems in order to maintain a flow of (largely non-marketable) goods and services that will secure wider social, economic and environmental benefits (Gray, 1997). Undervaluation has resulted in these wider economic benefits being under-emphasized in the development and conservation policy, planning and management practices. This is particularly problematic when governments make decisions about the allocation of public funds. Failure to recognize the full value of protected areas or to reflect this in markets and prices means that conservation-related products and activities continue to be unfairly discriminated against the consumption and production decisions, because they appear less valuable or profitable. Since the true value of protected areas is unknown to the public, societies also undervalue their contribution. Due to the absence of market for many protected areas, valuation is the only way to find a price for them and to have a cost-benefit analysis in decision making. This study helps policy makers at macro or sectoral levels to take in to account environmental resources when they make decision; not only the benefits but also the associated costs.

Second, ecotourism nowadays is an important source of income in a number of countries. As noted by Byrne *et al* (1993), the foreign exchange earnings from Kenyan elephants was more than $444 million in 1990. This indicates that protected areas now goes beyond their direct benefit of keeping the well-being of biodiversity and environment to become major source of national GDP. This study tries to come up with policy implications to make the park a major source of income to the nations GDP and generating employment.

Third, natural and environmental resources have many advantages to human beings; specifically the use value and non-use value. Since the 1960s many studies have been conducted to assess consumers' willingness to pay for the use value of natural recreational sites. The lions in Addis Ababa zoo are one of the endangered species in Ethiopia and this zoo is the only wild life protecting area in Addis Ababa which makes it unique. For this type of wildlife, the non use value contribution is relatively high. So the study come up with the measurement of both the use value and the non-use value of wildlife, which may help in understanding people's attitude toward natural wildlife protecting areas, creating awareness to the public about their intrinsic contribution socially, environmentally and economically; and ascertaining the non-use value of wildlife resources.

Finally, many protected areas are financed by government and some of them are self-financed, from the entrance fee collected from visitors. As noted by Wills (1997), many protected areas are under-funded all over the world. Therefore, another aim of this study is to find the optimum price for Addis Ababa lions Zoo Park that would make it a self-financed site. The study also tries to find ways to finance or raise funds from government, private and non-governmental organizations in order to preserve wildlife and keep biodiversity by showing their real value using valuation techniques.

1.4. Scope and Limitation of the Study

The scope of this study is limited to valuing the use value and the non use value of wildlife of Addis Ababa lions Zoo Park. In addition:

- It does not consider potential visitors in assessing consumer willingness to pay for the recreational use value of the site and the whole sample consider only actual visitors.
- The study does not assess the changes in the service provision of the park and consumer satisfaction. It focuses only on visitors' willingness to pay for existing conditions.
- Foreign visitors are not included in this valuation study because they are multi site visitors.
- The study is also limited to valuing only the benefit derived from wildlife and does not include other services such as children's playing station.

CHAPTER TWO

LITERATURE REVIEW

This chapter is concerned with the theoretical and empirical literature with particular emphasis on environmental valuation on zoological parks. First, the theoretical framework about valuation and the methods of environmental valuation will be discussed. Second, some of the empirical works on the use value of zoological parks using the Travel cost method and the non use value of wildlife using the Contingent valuation method will be discussed.

2.1. Economic Valuation of Natural Resources

Biodiversity in general and species preservation in particular, is currently a highly continuous global policy issue. Our sense of crisis concerning biodiversity arises from the fact that species are being lost at accelerating rate. Preserving the world wildlife is a growing policy issue. But which species should we attempt to save and what means should we employ? The first question involves valuation of species' contribution to biodiversity in general and to human being in particular, its genetic and economic uniqueness and its contribution to the survival of other species. It also requires an analysis of economic trade-offs and likelihood of success. Answering the second question entails estimation of the relative merits and costs of alternative preservation methods (Kenneth, 1999). Therefore, estimation of the economic costs and benefits associated with biodiversity protection is very important.

The traditional Cost-benefit analysis (CBA) tries to value all the effects of a project or policy in monetary terms, correcting for market distortions (taxes, subsidies, quotas, tariffs); economic

rent; consumer surplus and externalities, whether tangible or intangible. However, the fact that an intangible is difficult to quantify in physical term does not mean that it is difficult to quantify in monetary terms. Many environmental resources such as biodiversity or other recreational parks are difficult to quantify their value in monetary terms using CBA due to market failure. The only way of estimating their true value is done by using environmental valuation methods.

Valuation is the heart of environmental economics and is emerging as a very active and rapidly expanding field. In economics, the term "value" means the price individuals are willing to pay to obtain goods and services. In its simplest form economic valuation is the process of identifying the relevant changes in consumer demand and producer supply arising from a (project-induced) change in environmental quality, or the change in the provision of an environmental resource.

The basic strategy for environmental valuation is the co modification of the services that the natural environment provides. It serves to assess individual and group priorities and tradeoffs in the case of unpriced scarce commodities (Freeman III, 1993). By demonstrating and analysing economic benefits and costs, and relating these to real-world conservation and development issues, valuation has provided important insights for protected area management. However, valuation is not an end in itself rather; it is a tool which provides useful information and recommendations for decision-making.

The idea behind this approach is that a good or service comprises of various attributes, some of which are tangible and readily measured, while others are less tangible and thus more difficult to quantify. The total value of the good or service however, is given by the sum of all categories

of value, and not simply those that are easy to measure. So valuation is the only method to attach price for natural and environmental resources (Perman, 1999).

2.1.1. The Use of Environmental Valuation

One way to use environmental valuation is to be able to get a monetary value on a non-priced good. When a good is not priced it is likely that the resource is not being used in a way that gives the highest possible social benefit. An estimation of the economic value for a non-priced good could make it possible to use the resource more efficiently.

Some aspects of the environmental resources such as scenic view of mountains and beaches, wilderness experience in zoological parks and basic life support functions associated with ecosystem health and biodiversity give utility to human-beings but do not have market values as they are not directly bought and sold in the markets. To use a beach, a person may pay a user fee or entry fee, but this may not be the equivalent to the utility provided by that asset. Similarly some of us may not be using the environmental resource now, but would like to have the option to use it in the future or we would like particular species such as Panther Leo Abyssinica lion or Gelada Baboon to be preserved though we do not use it now because we value its mere existence. In all these cases, the use of price-based models may not be appropriate. For a marketed good, the demand and supply for the good at equilibrium determine the market price, which acts as an invisible hand to allocate the resources efficiently. Other important characteristic of these marketed goods are the existence of private property rights and divisibility of factors of production. Because most of the environmental goods do not have property rights, and even if we assign, we cannot exactly know the demand for the good, the

only way to know about the people's preference is to ask them through some hypothetical surveys. Generally the application of economic valuation in protected areas like zoological parks has the following advantages:

First, a better understanding of the economic value and costs of parks has many practical applications. Valuing parks underlines the fact that they constitute far more than a static contribution like climate modulation and preserving wilderness for future generation. They form a stock of natural resources, which if managed sustainably can yield in perpetuity a wide range of direct and indirect economic benefits to human population. Especially, being able to show the value of non-market benefits in cash terms has underlined the fact that the economic worth of parks extends beyond direct, commercial resource uses, and has helped to present a more complete picture of the economic significance of parks over time.

Second, the application of valuation techniques to calculate the cost and the benefits derived from parks provides important information about where and why there exist economic disincentives to conservation. As Munasinghe (1994), points out, when valuing parks there are two main questions to be asked: who are the losers and winners when parks are conserved, and when parks are over-exploited. As long as land and resource users incur a net benefit from parks degradation they continue to have a strong disincentive to conserve parks. A better understanding and broader definition of these costs has provided important information for understanding and addressing the economic causes of park degradation and loss.

Third, Valuation helps to justify parks in development terms. Valuation can show and quantify the actual and potential contribution of parks to national economic growth, employment and income, to local livelihoods, to commercial profits and to industrial activities; and has shown

how this information can be used to influence mainstream development decisions and economic indicators.

Fourth, Valuation identifies ways of improving existing markets and prices for park goods and services and developing new ones; and it also provides justification for raising funding levels. Quantifying the total economic value of parks can show where goods and services are currently underpriced by the market. It can also indicate where there is potential to develop new markets or prices to charge park beneficiaries or to capture park benefits as cash values. In addition to generating revenues, prices and market measures can provide an effective means of regulating the demand for resources and of providing incentives for sustainable management.

2.1.2. The Total Economic Values of Natural Resources

The concept of total economic value (TEV) emerged in the mid-1980s and is now widely used to identify the economic benefits associated with protected areas (Phillips, 1998). Instead of focusing only on direct commercial values, TEV encompasses the non-market values, ecological functions and non-use benefits associated with protected areas. Therefore, it presents a more complete picture of the economic importance of protected areas; it clearly demonstrates the high and wide-ranging economic costs associated with their degradation, which extends far beyond the loss of direct use values. According to Pearce and Turner (1994), the total economic value consists of the different use value and non use value.

The use value of environmental resources is the sum of extractive and non extractive value or service of the environment which is directly absorbed by the participant consumer directly or

indirectly. The total use value of a resource can be decomposed in to direct use value and indirect use value.

Direct use value is derived from goods, which can be extracted, consumed or directly enjoyed. It is also therefore known as extractive or consumptive use value. Whereas indirect use value is referred to as non-extractive use value, derived from the services that an environmental resource provides. A wetland, for example, acts as a water filter, often improving water quality for downstream users. This service is valued by downstream users, but does not require any good to be extracted or consumed.

Non-use values are defined as those benefits or welfare gains or losses to individuals that arise from environmental changes independently of any direct or indirect use of the environment. Non-use values are less direct, less tangible benefits to society. This category can be further subdivided into (1) option value (2) existence value (3) intrinsic value

Existence value - the very existence of environmental assets are valuable. For example, existence of natural habitats of grizzly bears may be considered to be valuable, though people do not necessarily want an encounter with the bears in the wild. Existence values include bequest, stewardship, and benevolence motives.

Benevolence motive reflects the desire to conserve an environmental resource for potential use by others.

Stewardship motive is derived from an altruistic sense of responsibility toward the preservation of the environment and a desire to reduce environmental degradation.

Bequest value - value derived from our desire to preserve the environment for relatives and friends, and also for all other people living today and future generations, so that they may

benefit from conservation of the environment. For example, preserving a national park may benefit future generations, although not everybody of the present generation has an intention to visit the park.

Option value - is the assessment of value attached to an option that would be available in the future. For example, once biodiversity is lost at the expense of development, the possibility (option) of benefiting from it is gone forever.

Intrinsic value of nature reflects the belief that all living organisms are valuable regardless of the monetary value placed on them by society.

In case of Addis Ababa Lions Zoo Park, the indirect use value could be the shelter that it gives to all life in the zoo; whereas the direct use value would be the recreational service gained by visiting the park while the option value is a value that compares current benefits of the park with future benefits. The bequest value of the Park could be the value that represents the future use of the park for future generations. Existence value in the case of this study could be the value that represent preserving biodiversity inside the park.

2.1.3. Methods of Environmental Valuations

Environmental valuation is largely based on the assumption that individuals are willing to pay for environmental gains and, conversely, are willing to accept compensation for some environmental losses. The individual demonstrates preferences, which, in turn, place values on environmental resources. Environmental economists have developed a number of market and non-market-based techniques to value the environment.

According to Pearce and Turner (1994), environmental valuation can be broadly divided in to two kinds of methods: Revealed preferance and stated preferances. Revealed preference techniques relay on the analysis of observable behavior. On the other hand, stated preference techniques are based on individuals' responses to surveys and questionnaires relating to hypothetical situations.

Mitchell and Carson (1989, pp.74-87) have offered a classification of methods for estimating values that are based on two characteristics of the methods. The first characteristics is whether the data comes from observation of people acting in real world setting where people live with the consequence of their choice, or comes from people's response to hypothetical question of the form " what would you do if...?" "Would you be willing to pay…?" the second characteristics is whether the method yields monetary value directly or whether monetary values must be inferred through some indirect technique based on a model of individual behavior and choice.

Table 2.1: Classification of Environmental Valuation Methods

	Observed Behavior	Hypothetical
Direct	Direct Observed Competitive market price Simulated markets	Direct hypothetical Bidding games Willingness to pay questions
Indirect	Indirect observed Travel cost Hedonic property values Avoidance expenditure Referendum voting	Indirect hypothetical Contingent ranking Contingent activity Contingent referendum

Source: Adopted from Mitchell and Carson (1989), p.75

As the table depicts, on the basis of these two methodological characteristics, any method for estimating environmental and resource values can be placed in one of four categories- Direct observed, Indirect observed, Indirect Hypothetical and Direct Hypothetical.

Direct observed methods include the use of competitive market prices and the use of the results from simulated markets set up specifically to learn about individual values. With Direct Observed methods, the observations are based on the actual choices made by people who are maximising their utility, subject to the relevant constraints, and who are free to choose the quantity of the good at a given price. The data reveal values directly in monetary units since the choices are made on the basis of prices.

Indirect observed methods are also based on actual behavior reflecting utility maximization. One type of indirect method is based on observed choices in a referendum setting. If an individual is offered a fixed quantity of a good at a given price on a take-it-or-leave-it or a yes-

no basis (as in a referendum), observation of the choice reveals only whether the value of the offered good to the individual was greater or less than the offering price. A family of discrete choice and random utility models has been developed for the purpose of deriving exact value measures from these choices. In other instances the resource-environmental service does not have an offering price, but its quantity does affect the choices people make about other things such as quantity of market goods. In these cases, the value of the resource-environmental service must be inferred through the application of some model of the relationship between market goods and the environmental service. Most such models are based on the assumption of some kind of substitute or complementary relationship between the environmental service and marketed goods and services.

Indirect observed methods involve a kind of detective work, in which clues about the values individuals place on environmental services are priced together from the evidence that people leave behind as they respond to prices and other economic signals.

The Indirect Hypothetical methods draw their data from people's responses to hypothetical questions rather than from observations of real-world choices. The models and techniques used to draw inferences about values from these data are often the same as those used in the Indirect observed methods.

In the indirect Hypothetical category of the contingent ranking approach, in which individuals are given a set of cards, with each card depicting a different situation with respect to the level of the environmental service flow in question and other attributes of choice (number of visits to a

site, congestion level, and admission fee, for example). People are asked to place their cards in order of preference. Values for environmental services can be inferred from these rankings.

The fourth category, Direct Hypothetical methods, involves asking people directly about the values they place on environmental services by, in effect, creating hypothetical markets. For example, people could be asked what value they place on specified changes in environmental services, or how much of an environmental service they would "purchase" at a given price.

The above discussion illustrates the different types of environmental valuation methods. However the two most widely used types of valuation techniques are the Travel cost method and the contingent valuation method.

A. Contingent Valuation

The Contingent Valuation Method (CVM) is one of the techniques for the valuation of non-market resources and in fact the commonly used technique for valuing the non use values or passive values of the environment. This is a survey based method, where people are asked directly how much money they would be willing to pay (or willing to accept) to maintain the existence of (or be compensated for the loss of) some environmental feature such as biodiversity. This technique is called 'contingent' valuation method because people are asked to state their willingness to pay, contingent on a specific hypothetical scenario and description of the environmental service. The contingent valuation method is also referred to as a 'stated preference' method, because it asks people to directly state their values, rather than inferring values from actual choices. The fact that CVM is based on asking what people say they would

do (stated) as opposed to what people are observed to do (revealed) is the source of its greatest strength as well as its greatest weakness.

The theoretical method of CVM was first proposed by Ciriacy (1947) as a method for eliciting market value of soil conservation. But the method was practically applied in 1963 by Davis (1963) to estimate the value hunters and tourists placed on a particular wilderness area. The contingent valuation approach has been applied to wide environmental and resource issues: outdoor recreation; protecting wetlands, wilderness areas, endangered species, and cultural heritage sites; improvements in public education and public utility reliability; reduction of food and transportation risks and health care queues; and provision of basic environmental services such as drinking water, air quality and garbage pickup in developing countries (Carson, 2000).

B. Travel Cost Method

The Travel Cost Method (TCM) is one of the most frequently used approaches to estimate the economic use values of recreational sites. The TCM was initially suggested by Hotelling (1949) and subsequently developed by Clawson 1959; to estimate the benefits from natural recreation sites. The method is based on the premise that the recreational benefits at a specific site can be derived from the demand function that relates observed users' behavior (the number of trips to the site) to the cost of a visit. One of the most important issues in the TCM is the choice of the costs to be taken into account. The basic premise of the travel cost method is that the time and travel cost expenses that people incur to visit a site represent the "price" of access to the site. It assumes that the value of the site or its recreational services is reflected in how much people are willing to pay to get there. It is referred to as a "revealed preference" method, because it uses

actual behavior and choices to infer values. Thus, peoples' preferences are revealed by their choices. So, peoples' willingness to pay to visit the site can be estimated based on the number of trips that they make at different travel costs. This is analogous to estimating peoples' willingness to pay for a marketed good based on the quantity demanded at different prices. The travel costs which people incur to visit a site are a good proxy for the amount they value the use of the site.

The travel cost method is relatively uncontroversial, because it is modeled on standard economic techniques for measuring value, and it uses information on actual behavior rather than verbal responses to hypothetical scenarios. It is based on the simple and well-founded assumption that travel costs reflect recreational value, and it is often relatively inexpensive to apply (Gum and Martin, 1974).

The TCM is based on the assumption that changes in the costs of access to the recreational site (c_2) have the same effect as a change in price: the number of visits to a site decreases as the cost per visit increases. Under this assumption, the demand function for visits to the recreational site is $x_2=f(c_2)$ and can be estimated using the number of annual visits as long as it is possible to observe different costs per visit. The basic TCM model is completed by the weak complementarily assumption, which states that trips are a non-decreasing function of the quality of the site, and that the individual forgoes trips to the recreational site when the quality is the lowest possible (Freeman III, 1993).

2.2. A Review of the Empirical Literature

Although methods for valuing environmental goods and services began to be developed as far back as the 1970s, they only began to enter mainstream environmental economics and be widely applied to protected areas in the late 1980s. Many studies conducted before focused only valuing the use value of recreational site and limited to value the non use value contribution of natural resources. This section reviews some of the empirical researches conducted in valuing the non use value of wildlife's using contingent valuation method and the recreational use value of zoological parks using the Travel cost method.

2.2.1. Studies on the Valuation of Non Use Value of Wildlife Using the Contingent Valuation Method.

Hamid and Majid (2005) conduct a research on the non use value of ecosystem. The purpose of this research was to determine the existence value of the north forests of Iran (NFI), adjacent to Caspian Sea, and measure individual's willingness to pay (WTP) using dichotomous elicitation method. The mean of WTP for existence value of these forests was found to be US$2.51 household/month. The finding of this study showed that, individual's willingness to pay for the non use value of conserving wilderness area was very high. Likewise, Mohd (2009) conducted a research to determine WTP for conservation of wilderness area called the Redang Island Marine Park, Malaysia and found the mean WTP to be between RM7.8 and RM10.6. In contrast, the research conducted by Matthew and Stephen (2000) on valuation of consumer attitude for non use value of endanger species using contingent valuation method is very interesting in analyzing different nonuse value of the species but fails to find mean or median willingness to pay. Based on this premises, it is possible to conclude that environmental attitudes are found to be

significantly related to the way respondents rate the importance of nonuse motivations. Similar to the research of Matthew and Stephen (2000), the research conducted by Nirupam (2008) to value conservational value of the Asian Elephantes using Contingent valuation fails to use mean WTP but the result of this study is unusual and surprising. The people valued the non use value of wildlife twice higher than the direct use value.

Generally from these studies one can realize the importance of nonuse value of wildlife, especially for endemic and endangered wildlife, than the direct use value, which would strengths environmental protectionist institution.

2.2.2. Studies Using the Travel Cost Method on Recreational Use Value of Wildlife Protecting Parks

There is a growing body of literature that focuses on valuing wildlife protecting parks in developing countries. The primary approaches used in these studies -Travel Cost (TC) Method and Contingent Valuation (CV) - were both pioneered in the Ethiopia but all of the researches conducted before focused on Amusement parks rather than being concerned on wildlife protecting areas to the best of the knowledge of researcher.

Kaosa (1995) used the TCM to measure the Khao Yai National Park use value and the CVM method to measure its nonuse value. The TCM estimates showed the direct benefit of 1,420 bahts per visit, of which 870 bahts is the consumer surplus. The average WTP for entrance fee is 22 bahts per person. Likewise, the study by Isabe (1994) to estimate the average consumer surplus (CS) per day of visit of an individual to the Peneda-Gerês National Park (PGNP) using

Individual Travel cost method showed that the average individual point CS per day is estimated to be €194 varying between €116 and €448. Both findings indicated that the value of National Parks was certainly positive and of a reasonable magnitude. This suggests some positive marginal benefit of park improvements. When compared to the marginal cost, it indicated that park improvements would yield a net gain to society.

Himayatullah's (2003) Study estimates the benefits of the Margalla Hills National Park near Islamabad. The study result showed that Annual benefits from the park are considerable—the total annual consumer surplus or economic benefit obtained from recreation in the park is approximately Rs. 23 million (US $ 0.4 million). Similarly, another study by Shammin (1999) used TCM to determine consumer willingness to pay for the service of Dhaka zoological garden. The result of the study showed that people's average willingness to pay for the services and attributes of Dhaka Zoo was US $ 7.46 per visitor day. The study also suggests the optimum entrance fee to the zoo, which can be raised to 10 taka. The study areas for both studies are greatly appreciable from wildlife conservation point of views. Both studies capture only the use value of the national parks but within these national parks there are many endemic animals for which high non use value is expected. The inclusion of non use value of zoological park in the estimation will bring tangible results. Whatever else the result by itself infers that zoological parks have intensively been used for recreational site for the public and as a main source of income for the parks authority. Furthermore, the study by Shammin (1999) used ordinary least square to find consumer surplus but since the dependant variable is truncated, the result from OLS will be biased.

2.2.3. Studies Using the Travel Cost and the Contingent Valuation Methods for Environmental Resources in Ethiopia

Mahamud (1998) used individual TCM to conduct a research on the economic valuation of Sodere natural recreational area. The purpose of this research was to determine the recreational benefit of the site. The result showed that the total annual on site recreational benefit was estimated to be Birr 9,842,094.80 which is higher than what the authority of the site collected, which is not more than 100,000 birr. Similarly, Melaku (2007) conducted a research to estimate the economic value of Bishangari lodge using the travel cost method. The result of the study showed that the recreational benefit of the site was estimated to be Birr 3,943,500 which is four times higher than the authority collects from entrance fee. The result of both studies showed that the total amount that the recreational site authority collect through entrance fee from visitors does not reflect the actual consumer willingness to pay. This conclusion is also supported by Mesfin (2010), who conducted a research on the recreational benefit of Wondo Genet recreational site using Individual TCM, and Sitotaw (2003), who applied the Individual TCM to value the economic benefit of Wabi-Shebele-Langano area using truncated poisson model. The Individual travel cost method showed that the average recreational benefit per annum is estimated to be Birr 7,899,301 for Wondo Genet recreational site and Birr 8,685,777 for Wabi-Shebele-Langano recreational site. The result of these two studies is quite similar since both are found in similar agro ecological zone and used similar methodology to estimate the annual benefit. Contrary to the study of Mesfin (2010) and Sitotaw (2003), the study conducted by Terefe (2000) on the economic value of Tis-Abay waterfalls used the zonal TCM. The result showed that the optimal gate fee is set to Birr 40.

In the above all studies monthly income of the respondent, availability of substitute, household size, age of the respondent and travel cost are found to be the main determinant for estimating the demand relationship for the recreational benefits. However, all the above studies accounted only for the use value of the protected areas.

Regarding the nonuse value contribution of wildlife, no valuation research was conducted before to the best of the knowledge of researcher in Ethiopia.

The research conducted by Fisseha (1997) on household willingness to pay for improved water supply service on Meki town used contingent valuation method. According to the estimation, the rural households are willing to pay five times higher than the actual price collected per insera. Similarly, Solomon (2007) founds a positive household willingness to pay for the solid west management options: the case of Yeka sub city, Addis Ababa. The paper found that the household in the sub city are willing to pay an additional charge of Birr 12.95 per month.

Using the contingent valuation method two similar studies was conduct by Yalemzewd (2007) and Solomon (2007) on the valuation of urban green spaces and valuation of urban forests, respectively. The result from these two studies confirms household's positive willingness to pay for urban green environment policies. The study by Yalemzewd (2007) using probit model estimated the mean WTP of the respondents to be Birr 16,682,574 while the study by Solomon (2007) used Tobit model to arrive at the mean WTP and the estimated annual mean WTP is approximately Birr 51,182,532. Furthermore, this study also compared the result from open ended and dichotomous choice formats and the result found from the later is one third higher than the open ended format.

All the above CVM studies also identified that the variable monthly income, level of education and household size are the main determinant for positive WTP. Besides, all the studies had concluded that the result from the CVM survey is theoretically and practically consistent and gives a reliable result. However, all the above studies failed to account the non use value part of environmental resources.

The study on Addis Ababa lions Zoo Park tried to fill this gap by estimating the recreational value and the non use value contribution of wildlife to the society.

CHAPTER THREE

METHODOLOGY OF THE STUDY

3.1. Source of the Data

Environmental and natural resources such as wildlife have a significant contribution to human beings through consumptive and non-consumptive use value of wildlife. However, the absence of market for these natural resources is the main problem for their efficient and optimal consumption. The use of valuation method helps to find the price or economic values attached to natural and environmental resources, which is further useful in efficient allocation of these resources. So the applications of valuation is important in determining the real value of non marketed goods directly by asking individuals willingness to pay for the conservation of wildlife or indirectly through market based instruments. To find the economic value of wildlife of Addis Zoo Park the study uses primary data that was collected from a survey through structured questionnaires. Respondents were asked directly their willingness to pay for the non use value of wildlife and indirectly asked their willingness to pay through market based instrument. Data were obtained from an on-site questionnaire from direct visitors of Addis Zoo Park and a field questionnaire from the population of Addis Ababa aged over eighteen years.

3.2. Survey Design

3.2.1. Introduction

The field work for the survey was conducted by well trained enumerators. These enumerators were recruited, trained and deployed to Addis Zoo Park and to different areas of Addis Ababa. To make the main survey less time consuming and more attractive to the respondent, a pilot survey was done. But the major aim of the pilot survey was to collect direct 'open-ended' information about how much respondents were willing to pay, which could then be used to set the threshold values for the final 'dichotomous choice' version of the survey.

3.2.2. Sample size and Sampling Techniques

The service valued in this study is Addis Ababa lions' zoo recreational site which provides service primarily wildlife habitat for the relevant population. Having a representative sample size is a crucial substance to obtain a proper and reliable estimation of the total economic value of wildlife. Cost of sampling, variability of the population and the margin of error were some of the factors considered for the choice of the sample size. This study tries to measure the total economic value of Addis Ababa lions' zoo, by taking 150 visitors as a sample to assess consumer WTP for the direct use value and 90 non -visitors for non-use value.

The sample sizes were calculated using the equation that follows

$$n = \frac{N}{1+Ne^2}$$

Where:

n is the required sample size

N is the target population size

e is the desired level of precision

The target population size for the TCM was taken to be the total number of visitors and for CVM the population of Addis Ababa aged above 18 years. The desired margin of error was set equal to 8%. This margin of error ensures representativeness from the selected population, because the general accepted margin of error for representative samples is 10% or less (Hosking and Preez, 2003). Accordingly, the sample sizes were estimated to be 158 visitors for the use value part of the park and 156 respondents for the non use value. Due to time and financial constraints, a sample size of 90 respondents was considered in the non use value case and to make this sample more representative the sample was stratified to include different segments of the society, that is, unemployed, students, high income group and low income group.

To assess the willingness to pay (WTP) for direct use value, the sample individuals were obtained from those visitors on the site during the survey. Since there are also other facilities like children playing station within the park, the study uses purposive random sampling in which the questionnaire was distributed only to direct viewer of wild life and plants.[5]

When a relevant sample is taken for non use value, important value may be missed if the geographic scope of the sample is too narrow, and the result can be tangible if sample is taken

[5] However, for onsite survey since a visitor values his privacy most, refusal rate was very high. But the patience and diligence of the enumerators had results with success. Many of the respondents were reluctant to provide critical information, specifically monthly pre-tax income and for that reason information were collected in categories.

from those non user or non visitor (Freeman III, 1993). To get a reliable estimate for non use value of the site, areas that are far away from the study area were selected. This was done for the reason that, people near the site have both use value and non use value which may under estimate the value attached to non use value. In contrast, people living far away from the site have only non use value. So to get a reliable estimate for the non use value of the site purposive random sample was taken within Addis Ababa, where children aged below 18 were excluded from the sample.

3.2.3. Data Set

The structured questionnaires were developed and distributed to the sampled respondents. Two types of structured questionnaires were designed to collect the information. The first questionnaire was prepared for on- site visitors which helped to estimate the use value of the site using Travel cost method. Relevant information was collected on the following variables:

- Travel expenses (the total amount of money spent to arrive to the park)
- The length of the trip (the distance of the trip in kilo meters)
- The amount of time spent for the trip (time spent for the trip measured in hour)
- The number of times they visited the site in the past year or season (measured in number of visits)
- Other locations visited during the same trip, and amount of time spent for each
- Substitute sites that the person might visit instead of the Addis zoo park, and the travel distance to each of the substitute sites

- Other reasons for the trip (was the trip only to visit the site or for several purposes?)
- Quality of the recreational experience at the site (asking visitors satisfaction level)
- Characteristics of the site and other substitute sites
- The person's monthly income or other information on the value of their time
- Other socioeconomic characteristics of the visitor

The second questionnaire is different in format and helps to gather information about the non use value of the park using the contingent valuation technique. The information collected includes the following: (a) socio-economic characteristic of non visitors, (b) attitude of non visitors in relation to sustainability of wildlife resources, (c) non visitor's perception about zoological parks, and (d) willingness to pay of non visitor for Addis lions zoo park conservation fee (bid price was presented).

3.2.4. Bid Design for Contingent Valuation Method

An important issue in the implementation of the contingent valuation survey and especially the DBDC one is the choice of initial and follow up bid vectors.[6] Bid design is important from the point of view of the efficiency of the estimators because they determine the variance-covariance matrix when they are the only regressors. To obtain a preliminary guess about the WTP distribution a pilot study with open-ended questions that directly asked the individuals the maximum amount they were willing to pay to protect wildlife in Addis Ababa Zoo Park was

[6] Double bound dichotomous choice (DBDC) is an elicitation method with an iterative second round question. For example if the respondent answers yes to the X ETB bid then they are asked if they are WTP say 2X ETB (or 1/2X or 1/3X ETB if they answered no to the initial question).

conducted. The result showed that, the range of response varied between 0 and 100 with high concentration at the lower end. To fit the observed data points to an underlying probability distribution, nonparametric kernel density estimation was used. The bandwidth for the estimated epanechnikov kernel is determined at 6.19 (Figure 3.1).[7]

Figure 3.1: Kernel density estimation for the stated WTP

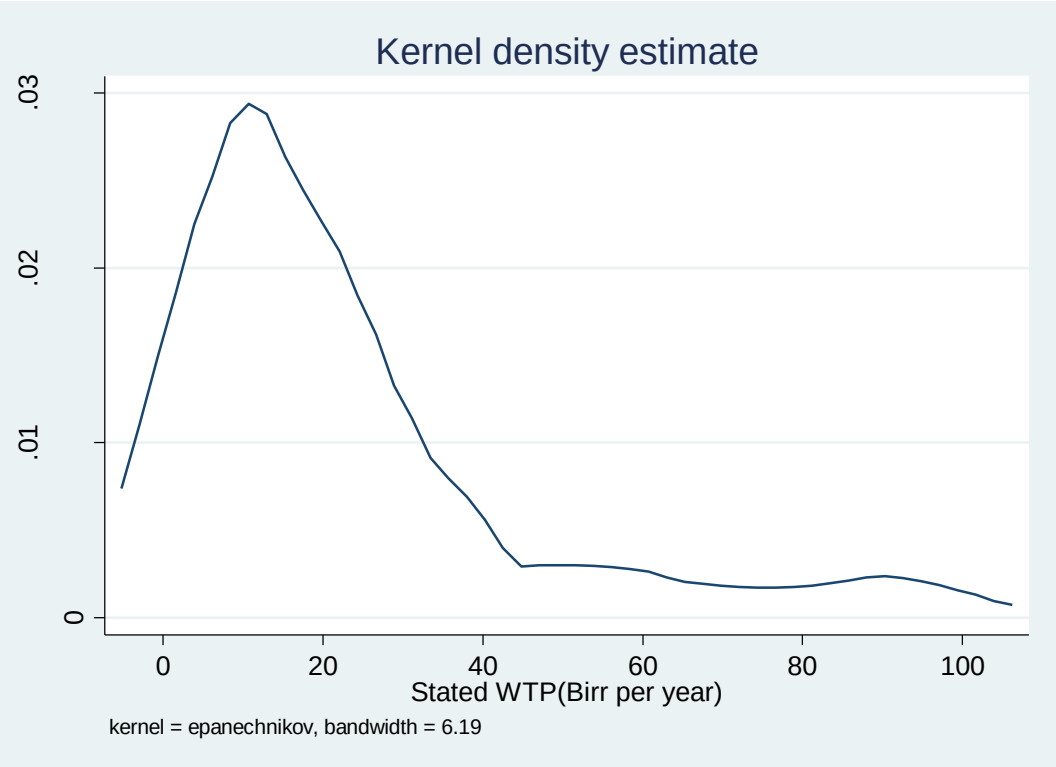

Figure 3.1 depicts that for observations greater than 30 the bid values are associated with a probability density value that is close to zero. In view of this, five starting bids of 5, 10, 15, 20 and 30 ETB were randomly allotted to 90 sampled individuals in the final survey. If the

[7] Kernel density estimation is a non parametric way of estimating the probability density function of a random variable. Kernel density estimation is a fundamental data smoothing problem where inferences about the population are made, based on a finite data sample. The bandwidth parameter (smoothing parameter) controls how fast we try to dampen the function and the use of Epanechnikov kernel minimize the variance.

respondents agreed to pay the offered bid the follow up bid is doubled and in case of a no response the respondents are offered a bid that is half of its initial value. For instance, when offered a bid of 5 ETB a follow up bid of 10 ETB is offered if the response is yes and in case of a no response a bid offer of 2.5 ETB is given to the respondent. Thus, the range of bid vectors in the follow up, that is, 2.5 ETB, 5 ETB, 7.5 ETB, 10 ETB, 15 ETB, 20 ETB, 30 ETB and 60 ETB, spanned the relevant left tail of the kernel density where most of the observations are concentrated.

3.3. Method of Analysis

The method of analysis used in this study is based on a joint analysis of travel cost method and contingent valuation method. The travel cost method used to estimate the recreational use value of the site and the contingent valuation method used to investigate the non use value contribution of wildlife. These two methods are chosen due to the following reasons:

1. If the site is primarily valuable to people as a recreational site, the travel cost method is more appropriate since there are many visitors.
2. The expenditures for projects to protect the site are relatively low. Thus, using a relatively inexpensive method like travel cost makes the most sense.
3. According to Rietbergen (1998), travel cost is more appropriate if the distance of travel is short. For this study almost all visitors are from Addis Ababa, so travel cost method is more appropriate in predicting the required use value.
4. Contingent valuation is used when there are endangered species or other highly unique qualities that would make non-use values for the site significant (Ibid). As mentioned

before, the lions in this zoo are the only traits in Ethiopia. Thus, the non-use value of the park is expected to be high.

3.3.1. The Travel Cost Method

This study employed travel cost method together with contingent valuation method to identify the benefits of the park to users. When using the TCM it is assumed that travel costs are a proxy for the price of a recreational trip. In this case, the cost of a trip will be calculated as the sum of the travel costs. However, it is necessary to assume that users select one site rather than multiple sites to visit on any one trip. The relevance of the assumption lies on the fact that if a consumer visits more than one site in one trip it may be difficult to estimate the travel distance and time for a specific park.

There are several ways to approach the problem, using variations of the travel cost method

These include:

1. A simple zonal travel cost method (ZTCM), using mostly secondary data, with some simple data collected from visitors.
2. An individual travel cost method (ITCM), using a more detailed survey of visitors.

The study used individual travel cost method due to the following reasons: First, the individual travel cost model accommodates individual visitor's inherent variation in socio economic characteristics and more individual data are available, since the recreation demand is estimated by number of individual visits. Second, heterogeneity in the population that is neglected by the

ZTCM is accommodated in the ITCM model. Third, The ITCM also avoids arbitrary zone definitions required in the ZTCM. Finally, the ITCM is better suited to provide inferences about individual consumer behavior. As a result, the ITCM gains better statistical efficiency than the ZTCM (Bowker and Leeworthy, 1998). The individual travel cost approach is similar to the zonal approach, but uses survey data from individual visitors in the statistical analysis, rather than data from each zone. This method thus requires more data collection and slightly more complicated analysis, but gives more precise results. The Individual Travel Cost Method uses survey data collected from visitors on their number of visits, travel costs and socio-economic characteristics.

The valuation of recreation benefit based on individual travel cost approach for this study is determined as follows.

In a single-site travel cost method (TCM) model, it is assumed that an individual's utility depends on aggregate consumption, X, leisure, L and number of trips y to the site:

$$U = U(X, L, y) \quad (1)$$

Where U is the individual's utility, X is the aggregate consumption, L is leisure and y is number of trips

The study further assume weak complementarity of trips with quality at the site, q. In other words, $\frac{\partial U}{\partial q} = 0 \; when \; y = 0$ (when a person does not visit the site, his or her utility is not affected by its quality), and y is increasing in q. The individual chooses X, L and y to maximize utility subject to the budget constraint:

$$W \times [T - L - y(t_1 + t_2)] = X + P_y \times y \quad (2)$$

Where W is the wage rate, T is total time,t_1 is travel time to the site, t_2 is travel time to home, f is the access fee (if any) and P_y is the full price of travel. This model further assumes that travel time and time spent at the site are exogenous, that there is no utility or disutility from traveling to the site, and that each trip to the site is undertaken for no other purpose than visiting the site. It also assumes that individuals perceive and respond to changes in travel costs in the same way they would to changes in a fee for being admitted to the site. Finally, the model assumes that work hours are not flexible. This yields the demand function for trips:

$$y^* = y^*(P_y) \quad (3)$$

Where $P_y = \frac{1}{4} \times hourly\ wage\ (t_1 + t_2) + travel\ cost\ is\ the\ full\ price\ of\ a\ trip.$[8] (4)

In this study, it is assumed that the demand function for trip is semi log because when compared with other functional forms like linear, quadratic and log-log forms it is highly efficient according to many studies. Englin (1995) compared linear, quadratic and semi log forms and got semi log is better in explaining the TCM demand function. Haab and McConnell (2003) deduce that semi log and log-log functional forms are preferred to other types of model specifications since they reduce hetroscadesticity and multicoolinrearity problems, and gives efficient and consistent estimates.[9]

To estimate the demand equation, it is necessary to ask a sample of visitors to report the number of trips they took in a specified period, cost per trip, wage and other individual characteristics that might affect the demand for visits to the site.

[8] $\frac{1}{4} \times hourly\ wage\ (t_1 + t_2)$ is the opportunity cost of travel time. The study takes ¼ of wage rate since many visitors visit the park during weekends and as a result the opportunity cost of time is small.

[9] Any estimate b is consistent estimator of β if $\lim_{n\to\infty} p(b_k - \beta| > \delta) = 0\ for\ all\ \delta > 0$, where n is the sample size and efficiency estimate gained by minimizing the variance of the estimate

Once the demand function has been estimated, the consumer surplus provides an approximation of the welfare associated with visiting the site. Formally, based on the demand function equation, the consumer surplus is equal to the area below the trip demand function and above the travel cost function. Estimation of the demand function and consumer surplus for the actual visitors is done using the count data model.

3.3.1.1. The Count Data Model to Estimate the Recreational Trip Demand Function

The econometrics model used to find the recreational demand function and the consumer willingness to pay for the use value of Addis Zoo Park uses information from Travel cost method. Count data models have become the standard in single-site recreation demand models (Creel and Loomis, 1990). Regression models for counts differ from the classical regression model in that the response variable is discrete with a distribution that places probability mass at nonnegative integer values only. Count data distributions are also characterized by a concentration of values on a few small discrete values (such as 0, 1 and 2), skewness to the left and intrinsic heteroskedasticity with variance increasing with the mean (Cameron and Trivedi, 1998).

The study used Truncated Poisson count data model (TPM) to estimate the demand function of number of visits and the consumer surplus of visitors. Hellerstein and Mendelsohn (1993) provide a theoretical basis for the use of count data to model recreational demand. On any choice occasion, the decision whether to take a trip or not can be modeled with a binomial distribution. As the number of choices increases, this asymptotically converges to a Poisson distribution. The density of this distribution for the count (y) is given by:

$$\Pr[Y = y] = \frac{e^{-\mu}\mu^{y}}{y!} \quad , y = 1,2, \ldots \ldots \qquad (5)$$

Where, μ is the intensity or rate parameter. When the first two moments of this distribution equal each other (E[Y] = μ = V [Y]), a property known as equidispersion occur. This model can be extended to a regression framework by parameterizing the relation between the mean parameter μ and a set of regressors x. An exponential mean parametrization is commonly used

$$\mu_i = \exp(X'\beta), \qquad i = 1,2, \ldots, n \qquad (6)$$

Where x is the matrix of k regressors and β is a conformable matrix of coefficients to be estimated. Given the above two equations, the Poisson regression model can be estimated, under the assumption that $(y_i \mid X_i)$ are independent, by maximum likelihood.

However, the estimation of trips demand for onsite survey is faced with three major problems:

a. **The existence of over dispersion**: over dispersion occur when the variance is larger than the mean for the data, because of a few respondents making a large number of trips while most respondents make only a few. This makes the Poisson model overly restrictive. Over dispersion has a qualitatively similar consequence to heteroskedasticity in the linear regression model. Therefore, as long as the conditional mean is correctly specified, the Poisson maximum likelihood estimator with over dispersion is still consistent, but it underestimates the standard errors and inflates the t-statistics in the usual maximum-likelihood output. For cases where the over dispersion problem is serious, a widely-used alternative is the negative binomial model. A likelihood-ratio test based on the parameter α (degree of dispersion) was employed to test the hypothesis of no over dispersion. The test shows that over dispersion is not a problem for the data

collected since the over dispersion parameter is zero as shall be explained in the data analysis section.

b. **Truncation**: which is one of the characteristics of the data in this study, since data are collected on actual visitors and potential visitors are ignored, consequently, the data are truncated at zero. Failing to account for truncation, leads to estimates that are biased and inconsistent because the conditional mean is misspecified.[10]

c. **Endogenous stratification**: This is also another characteristic that is considered in the formulation of the model for on-site survey studies. Most of the time, the data obtained on-site are endogenously stratified. This is because a visitors' likelihood of being sampled is positively related to the number of trips they made to the site. That is, frequent visitors are more likely to be sampled. This problem (sometimes referred to as choice-based sampling) was first addressed by Shaw (1988). Again, this problem is not found to be a problem for the data used in this study since data was collected at the gate of the site.

Given the over dispersion and endogenous stratification parameters constant, the standard regression packages can be used to estimate a Poisson model that is adjusted for truncation. In this case (Shaw 1988) shows that:

$$Pr[Y = y|Y > 0] = \frac{e^{-\mu}\mu^{y-1}}{(y-1)!} \quad , \mathrm{y} = 1,2, \ldots\ldots \qquad (7)$$

The dependant variable (y) in this case is the number of trips which are truncated at zero, which means the number of trips is one time or more than one since only actual visitors are included.

[10] Biased estimates occur when the Poisson estimator is on average differ from the true value β [E(b)≠ β

3.3.1.2. Independent Variables and Expected Sign for TCM

The following variables are identified as the main determinant for the number of trips made to Addis Zoo Park for the last 12 months.

Travel cost: The travel cost includes all costs incurred during the travel time (cost of travel and time cost) to the park including a return.[11] Travel cost is expected, in this study, to be the main determinant of the number of visits. When the travel cost increases the number of times to visit the park will decreases which mean travel cost have a negative effect on the number of visits to the Park.

Income: Income is expected to play a major role in respondents' decisions concerning paying to visit recreational sites. In other words, it is expected that those on higher incomes are more likely to visit the park many times. So income will have a positive effect on the number of visits

Age: The study expects a significant relationship between age and the number of trips to recreational site. Young people are more likely to visit parks than older ones. When age increases they are more likely to be engaged in social activities and they are less likely to make visits to recreation sites. However, the relationship between visitors' age and the number of visits is indeterminate a priori.

RSW: This refers to visitor's relationship with wildlife. This RSW variable is included in the study as dummy variable, where a value of 1 is assigned if there is relationship with wildlife and 0 if there is no relationship with wildlife. The relationship with wildlife is in different ways, for example, membership in environmental or wildlife protecting areas or visiting wildlife protecting areas. This is done to test if they have influence on the number of visit. The study expects a positive relationship between the number of trips and relationship with wildlife.

[11] Estimation of the time cost will be explained in the next section.

SUP: This refers to the number of people that a respondent supports. The study expects a negative relationship between the number of visit and SUP. As the number of people an individual supports increases then the number of visit to recreational site decreases. This is because, one would prefer supporting his or her family to spending on recreational activities since the two goods are competitive.

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

3.3.1.3. Measurement of Travel Time Cost

TCM assumes that the quantity of visits by users of sites will decrease with the length of the trip to a specific site due to the higher travel and time costs. The working assumption here is that the time used for traveling to and from the site could have been devoted to other endeavors (Parsons 2003), so the cost of time is the benefit of the next best alternative forgone. The original TCM assumed that inclusion of time in the demand function has no effect at all. But some past researches have shown that assumptions on time values are primary determinants of the estimated values of recreation activities and its exclusion results in under estimation of the recreational value (Cesario 1976). Therefore the value of time as a commodity is the amount one is willing to pay to save time spent travelling and recreating on site. Hence, the argument over the value of time stems from the notion of opportunity cost. The opportunity cost is, thus, the utility a person would gain by doing the next best alternative activity during the time spent travelling to the Addis zoo park.

The fundamental problem with the travel cost method has been the difficulty of capturing effectively the value placed on travel time by consumers of recreation services. In practice, most studies estimate time cost as a proportion of the visitor's wage which assumes that individuals have a flexible working schedule, thus they can substitute work time for leisure time at the margin. Taking wage as an appropriate measure has some problems. First, however, most people are constrained by fixed work-holiday schedules and may have no opportunity to substitute paid work for leisure. For these people, the leisure/work trade-off does not apply, since they cannot exchange work time for leisure. In many instances, those who accumulate holiday time or fail to take their holidays as scheduled often face the choice to take the time off at some point or lose that time with no additional compensation. The trade-off in this case is zero. The trade-off is also implausible for retirees, homemakers, students, and the unemployed. The trade-off may still apply to the self-employed and others who have discretion over their work schedules. Second the value and cost of time are different concepts. Shaw (1992) maintained that the value and the cost of time are different concepts. Someone with a low wage could value time very highly.

Some other studies consider leisure as a matter of an activity of time free of work, or of time off the job, then it might be conceivable to put a zero value on travel time. However, since time used for recreation can be allocated to alternative uses, time spent on a given recreational pursuit must have a cost. Opportunity cost of time in this case includes other activities like voluntary work, sport, pottering around at home, doing manual crafts, reading, studying or indeed going to another site for recreation.

There are four other methods used by previous researcher to find the opportunity cost of time. First, Cesario (1976) asked individuals directly about their opportunity cost of time. But the result is affected by the respondent judgment. Second, Shaw (1992) estimated the shadow wage by using contingent behavior questions about respondents' willingness to work further hours along with actual working decisions. Third, the opportunity cost of time has been also derived by dividing the total hour work by each respondent's gross income. Fourth, McConnell and Strand (1981) assumed that the cost of time would be some proportion of the visitor's wage rate and that proportion could be estimated from the data using regression analysis.

Despite the difficulties and the alternatives described above, the most commonly used approach to value time in travel cost models of recreation demand is still wage-based (Parsons 2003).

Cesario (1976) first suggested approximating the opportunity cost (value) of time as some proportion of the wage rate. In relation to this approach, a key question is which proportion of the wage rate should be used as a proxy for the opportunity cost of time? Thirty-three percent has probably been the most often chosen fraction (Cameron, 1996).

Ward and Beal (2000) suggest zero percent as appropriate, since individuals travel for leisure and recreation mostly during holidays when they face no loss of income. Parsons *et al*. (2003) observe that the recreation demand literature has more or less accepted 25% as the lower bound and the full wage as the upper bound.

This particular study has used wage rate as a proxy for the opportunity cost of time and 25% of wage rate is taken as an opportunity cost of time, which is the lower bound in the above finding,

(IBID). This percentage is appropriate from theoretical and practical ground. In many developing countries taking the full wage or higher amount as an opportunity cost may not be appropriate because of the limited work hour-leisure flexibility condition.

3.3.2. Contingent Valuation Method

It is clear from past studies that people are willing to pay for non-use or passive use of environmental benefits and contingent valuation method remains the only technique capable of placing a value on commodities that have a large non-use (Hamid and Majid, 2005). Since the non-use values contribution of wildlife are significant, especially for endangered species, other methods, such as the travel cost method, will tend to underestimate the benefits of preserving the site. With CV studies, the type of question used will have an important effect on results. Formally there are four types of elicitation formats: open ended, Bidding game, payment card and; single and double bounded dichotomous choice formats.[12]

This study used double bounded dichotomous choice questions (DBDC), which are those most commonly used in practice (Ibid). Respondents are asked if they would be willing-to-pay amount X for an amenity and if so (or if not) would they be willing-to-pay Y as well (instead). It is possible to obtain more information from this type of question format than others. Because double bounded dichotomous choice CV model is more efficient and has improved statistical information than single bounded model (Bateman, Langford, Jones and Kerr, 2001).

[12] Open ended elicitation method asked respondents their maximum willingness to pay while Iterative Bidding games asked respondents iteratively different bid prices until the highest amount willing to pay identified. Unlike the above methods, which were directly asking the respondents, Payment cards display a range of ETB values starting from zero and increasing at fixed intervals.

Haab and McConnell (2003) describe three reasons for efficiency gains from a follow-up question. First, the answer sequences of yes-no or no-yes put tighter bounds on willingness to pay. Second, the yes-yes pairs and the no-no pairs, even though they do not completely bound willingness to pay, constrain the part of the distribution where the respondent's willingness to pay can lie. Finally, the number of responses becomes two per person so that a given function is fitted with more observations. This method asks a tourist whether he (or she) is willing to pay a pre-chosen randomly assigned amount.

3.3.2.1. Model Specification for CVM

Given two bid prices, the level of the second bid is contingent upon the response to the first bid. If the individual responds "yes" to the first bid (y_1), the second bid (to be denoted y_2) becomes twice higher than the first bid ($y_{2=}2y_1$); if the individual responds "no" to the first bid, the second bid (y_2) is twice smaller than the first bid (($y_{2=}\ \frac{1}{2}y_1$). Thus, there are four possible outcomes:

a. Both answers are "yes" (1,1);

b. Both answers are "no" (0,0);

c. A "yes" followed by a "no" (1,0);and

d. A "no" followed by a "yes" (0,1)

Where 1 is for "yes" responses and 0 for "no" responses

Here, it is necessary to decide if the actions of first answer and second answer occur simultaneously or sequentially. This distinction is important if the sequence of actions has an

impact on the result. It is not ambiguous for any double dichotomous questions, the second question comes after the first question (y_2 depends on y_1 but not the reveres). Moreover, besides this decision it is necessary for the estimation method to account for the interdependency of the actions of the two answers, which is determined by the parameter ρ.

To formulate the model, the study assumes two WTP functions, which can be represented as follows:

Let Y_{i1}^{*} indicating the decision of a given individual i on WTP for a given bid price which depending on a set of economic and social characteristics X_{i1}, and other unobserved variables e_{i1}. The relation can be written as

$$Y_{i1}^{*} = X_{i1}^{'}\beta + e_{i1} \quad (8)$$

Y_{i1} = 1 if Y_{i1}^{*} >0, 0 otherwise

Similarly, $Y_{i2}^{* *}$ indicating the decision of a given individual i on WTP for a given bid price which depending on a set of economic and social characteristics X_{i2}, and unobserved variables e_{i2}. The choice is again an observed binary outcome as shown in Equation (9)

$$Y_{i2}^{*} = X_{i2}^{'}\beta + e_{i2} \quad (9)$$

Y_{i2} = 1 if Y_{i2}^{*} >0, 0 otherwise

The probability of occurrence can be found as:

$$Prob[y1 = 1, y2 = 1] = Prob\{y_2 \leq Max\ WTP\}$$

$$= Prob[y_2 = 1 \,|\, y_1 = 1] \times Prob[y_1 = 1]$$

$$= \frac{\Phi_2(y1=1, y2=1)}{prob[y1=1]} \times Prob[y1 = 1]$$

$$= \frac{\Phi_2\left(X_{y_{1i}}\beta_{y1}, X_{y_{2i}}\beta_{y2}, \rho\right)}{\Phi\left(X_{y_{1i}}\beta_{y1}\right)} \times \Phi\left(X_{y_{1i}}\beta_{y1}\right)$$

$$Prob[y1 = 1, y2 = 1] = \Phi_2\left(X_{y_{1i}}\beta_{y1}, X_{y_{2i}}\beta_{y2}, \rho\right) \quad (10)$$

The remaining probabilities that enter to the likelihood function are then:

$$Prob[y1 = 0, y2 = 0] = Prob\{0 < Max\ WTP < y_2\}$$

$$= Prob[y_2 = 0 \,|\, y_1 = 0] \times Prob[y_1 = 0]$$

$$= \Phi_2\left(-X_{y_{1i}}\beta_{y1}, -X_{y_{2i}}\beta_{y2}, \rho\right) \quad (11)$$

$$Prob[y1 = 1, y2 = 0] = Prob\{y_1 \leq Max\ WTP \leq y_2\}$$

$$= Prob[y_2 = 0 \,|\, y_1 = 1] \times Prob[y_1 = 1]$$

$$= \Phi_2\left(X_{y_{1i}}\beta_{y1}, -X_{y_{2i}}\beta_{y2}, -\rho\right) \quad (12)$$

$$Prob[y1 = 0, y2 = 1] = Prob\{y_2 \geq Max\ WTP \geq y_1\}$$

$$= Prob[y_2 = 1 \,|\, y_1 = 0] \times Prob[y_1 = 0]$$

$$= \Phi_2\left(-X_{y_{1i}}\beta_{y1}, X_{y_{2i}}\beta_{y2}, -\rho\right) \quad (13)$$

The form of likelihood depends on the model adopted. The study identifies three potential probit model specifications: Independent probit Model (IPM), Seemingly Unrelated Bivarite Probit Model (SUBPM) and Recurcive Probit Model (RPM). The choice of an appropriate model depends on the relationship between the two dependant variables (WTP answers). The Wald Test shows that ρ (the correlation parameter) is significant for the data collected and the

log-likelihood of the bivariate estimate is significantly less than the joint binomial probit log-likelihood, then indeed Y_{i1} and Y_{i2} are endogenous processes. Therefore, the study chooses SUBP model since it gives a better fit than other probit models.

A separate estimate of the determinants of individual's behaviors might therefore be biased because unmeasured variables simultaneously cause both outputs. This potential endogenous bias is purged using simultaneous equations. The random error terms, e_{i1} and e_{i2}, are dependent and normally distributed, such that $E[e_{i1}] = E[e_{i2}] = 0$, $Var[e_{i1}] = Var[e_{i2}] = 1$ and $cov[e_{i1}, e_{i2}] = \rho$.

The log-likelihood for the SUBPM is:

$$L = \prod_{y1=0} \Phi(-X_{y_{1i}}\beta_{y1}) \prod_{y1=1} \Phi(X_{y_{1i}}\beta_{y1}) \prod_{y1=1,y2=1} \Phi_2(X_{y_{1i}}\beta_{y1}, X_{y_{2i}}\beta_{y2}, \rho)$$
$$\prod_{y1=1,y2=0} \Phi_2(X_{y_{1i}}\beta_{y1}, -X_{y_{2i}}\beta_{y2}, -\rho) \prod_{y1=0,y2=0} \Phi_2(-X_{y_{1i}}\beta_{y1}, -X_{y_{2i}}\beta_{y2}, \rho)$$
$$\prod_{y1=0,y2=1} \Phi_2(-X_{y_{1i}}\beta_{y1}, X_{y_{2i}}\beta_{y2}, -\rho) \quad (14)$$

Where Φ is the standard univariate normal cumulative distribution and Φ_2 is the standard bivariate normal cumulative distribution with correlation ρ. Equations (8) and (9) are simultaneously estimated using maximum likelihood, producing unbiased estimates of parameter coefficients β and ρ.

For the above model the dependent variables are the two willingness to pay (WTP) answers and both of them are dummy variables; value 1 is assigned if a consumer is willing to pay the given amount bid price and if not, 0.

3.3.2.2. Independent Variables and Expected Sign for CVM

Income: Income is expected to play a major role in respondents' decisions concerning payment to support a policy. In other words, it is expected that those on higher incomes to be more likely to answer yes to the referendum question and subsequently to express a higher WTP.

Age: The study expects a positive relationship between age and willingness to pay for the designed policy. As an individual's age increases, his/her attitude toward the protection of wildlife would be better.

RSW: The relationship with wildlife and the nature of the data is as explained earlier. The study expects a positive relationship between the first bid price answer and relationship with wildlife.

SUP: The study expects a negative relationship between bid price answer and SUP. When the number of people an individual is supporting increases his willingness to pay for wildlife protection will decrease. This is because an individual is more likely to spend on his/her family than on protection of wildlife.

Bid prices: The study expects a negative relationship between bid price answers and bid prices. When the bid prices for conservation of wildlife increases, respondents' willingness to pay will decrease. This is because of the law of demand.

3.4. Description and Identification of the Site

Addis Ababa lions' zoo park is one of the two zoological gardens in Ethiopia. The other zoo is found in Haromaya University which was built mainly for the purpose of scientific study. Addis Abba lion's zoo is located in front of Yekatit 12 Martyrs Square (Sidist Kilo) within Arada sub-city. The zoo started its operations in 1948 with five male and 2 female lions, which were given to Emperor Haile Selassie as a gift from Wolega and Sidama district leaders. Before the lions were transferred to their current place, they were kept at the palace of Emperor Haile Selassie, the current Addis Ababa University.

This zoological garden has five endemic plants and two endemic animals. Table 3.1 and 3.2 shows the total number of wildlife in the zoo:

Table 3.1 Distribution of Wild animals in Addis Zoo Park

No	Name of Wild life	There Number	Status of animals	Scientific name of the species
1	Lion	19	Endemic	Panther Leo Abyssinica
2	Tortoise	7	No	Land Torto
3	Monkey	2	Endemic	Gelada Baboon
4	Apes	1	No	Pata mon
5	Apes	3	No	Vervet mon
6	Squirrel	2	No	White ni
7	Duck	5	No	Egip giz
8	Fish	10	No	Different type
9	Lesser	2	No	Lekudu
10	Deer	1	No	Gifauel

Source: Wubet Beautification and Recreational center for Addis Ababa, 2010

From table 3.1, there are ten different wild animals in the zoo. Out of these wild animals two of them are endemic; the lions Panther Leo Abyssinica and Gelada Baboon. The lions Panther Leo Abyssinica, found only in this zoo, make the park a potential tourist destination in the city.

Table 3.2The total number of Domestic and foreign plants within the zoo's

No	Name of the plant	Number	Nature	Age
1	Abesha Tside	2	Endemic	20-40
2	Zigiba	1	Endemic	40
3	Woyira	4	Endemic	>15
4	Abesha Girar	3	Endemic	>40
5	Korech	1	Endemic	>40
6	Others	107	Foreign	10-40

Source: Wubet Beautification and Recreational center for Addis Ababa, 2010

Five endemic plants and 107 different foreign plants cover most part of the area of the park and on average almost all wild plants are aged above 20 years. These wild plants serve as shelter for visitor and the green environment that comes with it attracts many other visitors to the site.

Addis Ababa lion's zoo park is the only zoological garden designed for recreational purpose in Ethiopia. This zoo, besides giving a direct recreational pleasure for visitors, it employs 37 people. Entrance fees charged on actual visitors, on the basis of age and nationality is a source of funding for the Zoo. Local children above five years old and students entrance fee is one ETB, visitors above the age of 10 pay double the amount. Foreign children are charged a fee of 10 ETB while their adult counterparts pay 20 ETB. Gate fee collections amounted to 1,000,300 ETB in 2009/10.

This study attempts to determine the optimal entrance fee to the park and the expected amount collected from viewing wildlife.

CHAPTER 4

EMPIRICAL RESULTS

The main objective of this section is to determine individuals' willingness to pay for the total economic value of wildlife at Addis Ababa lions Zoo Park. To find the total economic value of the site, travel cost and contingent valuation methods have been used for the use value and the non use value part of wildlife, respectively. The survey was conducted to collect information on WTP and the socio-economic characteristics of the respondents. This section presents the important findings and results obtained from the sample survey.

4.1. Descriptive Statistics

4.1.1. Descriptive Statistics for Travel Cost Method

A structured questionnaire was prepared and administered to generate the necessary data to address one of the research questions. This section presents the descriptive statistics of the data that was collected from 158 visitors from the onsite interview. Based on the survey data demographic and travel characteristics of the visitors are presented in Table 4.1.

Table 4.1: Distribution of the respondents' demographic characteristics

Demographic characteristics		Number (out of 158 respondents)	Percent (100%)
Sex	Male	88	55.7
	Female	70	44.3
Marital status	Married	33	59.5
	Unmarried	125	40.5
Education Level	Below Degree	83	52.6
	Degree and above	75	47.4
Preferred day of visit	Weekdays	21	13.3
	Weekends	125	79.1
	Public holiday	12	7.6

Source: Onsite survey result

Out of the total sample of 158 visitors, 88 (55.7%) were male and 70 (44.3%) were female. In the past, women were mostly engaged in domestic chores and hardly got the opportunity to attend school. The rise in the number of females in the recreational areas as visitors is an indicator of change in the society's attitude toward the gender division of different activities.

Broadly speaking, couples spent most of their leisure time in recreational areas. This study also shows that 59.5% of the visitors are related or married, whereas single and divorced visitors together account 40.5%.

Level of education among the sampled respondents is almost similarly distributed. 47.4% of respondents have at least a first degree and above while 52.6% of the respondents have lower level of education.

The respondents were asked about the preferred day of visits and 79.1% of the respondents preferred to visit Addis Zoo Park during weekends and 13.3% and 7.6% of the respondents preferred to visit during week days and holidays, respectively. This shows that many visitors

prefer to visit the park during their leisure time to working time. This finding supports our previous conclusion in the methodology section on the opportunity cost of time as one fourth of the wage rate. Since many visitors have preferred to visit the site during their leisure time the study takes the lower bound, which is one fourth of the wage rate, as an opportunity cost of time.[13]

Table 4.2: Cross tabulation of visitors travel characteristics and number of trips

Number of trips (per year)	Visiting alone or in group		Total (%)
	Alone (%)	In group (%)	
Small number of trips (1-23)	37.4	36.7	74.1
Medium number of trips (24-49)	5.1	15.8	20.9
High number of trips (50-80)	1.9	3.2	5.1
Total (%)	44.3	55.7	100

Source: Onsite survey result

As the above table revels, almost three quarters of the respondents made small number of trips to Addis Zoo Park with 74.1% and high number of trips account only 5.1%.

The table also shows that 55.7% of the visitors visit the site with their families and relatives and 44.3% were lonely visitors. Relatively high number of lonely visitors made a small number of trips as compared with visitors who were traveling in a group. For example; 37.4% of the lonely visitors made small number of trips but group visitors made only 36.7%. On the contrary, 3.2% of the group visitors made many trips while lonely visitors made only 1.9% of the total

[13] As Parsons et al. (2003) illustrates, if many visitors made trips in their leisure time, the accepted level of opportunity cost of time is 25% of the wage rate.

respondent. This indicates that when people travel to recreational areas with a group then there will be a tendency to make more trips than lonely visits.

Table 4.3: Cross tabulation of visitors level of satisfaction and number of trips

Number of trips (per year)	Satisfaction level			Total (%)
	Better than I expected (%)	As I expected (%)	Worse than I expected (%)	
Small number of trips (1-23)	10.8	54.4	8.9	74.1
Medium number of trips (24-49)	1.9	18.4	0.6	20.9
High number of trips (50-80)	1.2	3.8	0.0	5.1
Total (%)	13.9	76.6	9.5	100

Source: Onsite survey result

As depicted in table 4.3, many visitors were satisfied with the environment and the service delivery in the park. 90.55% of the visitors reported that they were satisfied with their stay in the park. 9.5% of the visitors responded that the park services were worse than their expectations and they only made small number of visits. More number of visits were made by those visitors who were satisfied with the park services. Table 4.4 identifies aspects of the park which attracted the visitors, and the respective number of trips made.

Table 4.4: Cross tabulation of attracting part of the park and number of trips

Number of trips (per year)		Attracting part of the park (AP)			Total (%)
		Existence of endemic wildlife (%)	Its green environment (%)	Its recreational service (%)	
Small number of trips (1-23)	Within AP	74.6	72.2	71.4	
	From Total	59.5	8.2	6.4	74.1
Medium number of trips (24-49)	Within AP	19.8	27.8	21.4	
	From Total	15.8	3.2	1.9	20.9
High number of trips (50-80)	Within AP	5.6	0	7.1	
	From Total	4.4	0	0.6	5.1
Total (%)		79.7	11.4	8.9	100

Source: Onsite survey result

Addis Ababa lion Zoo Park is the only recreational zoo park in Ethiopia, the only wildlife reserving area in Addis Ababa and a home to some endemic animals. The lions in Addis Ababa zoo are the only traits in Ethiopia which attracts many national and foreign visitors. The existence of endemic wildlife attracts many visitors as shown in table 4.4 with 79.7% out of which 74.6% of the respondents made small number of visits. This indicates that even if they are attracted by the existence of endemic animals in the park, the small number of endemic animals found in the park is also the main reason for the respondents' disappointment.

4.1.2. Descriptive Statistics for Contingent Valuation Method

This section presents the descriptive statistics of the data that was collected from 90 respondents to determine their willingness to pay for the conservation of wildlife. The demographic characteristics of the respondents are presented in Table 4.5.

Table 4.5: Distribution of respondents' demographic characteristics

Demographic characteristics		Number (out of 90 respondents)	Percent (100%)
Sex	Male	48	53.3
	Female	42	46.7
Marital status	Married	48	53.3
	Unmarried	42	46.7
Education Level	Below Degree	53	58.9
	Degree and above	37	41.1
Monthly Income	low income group	63	70
	High income group	27	30

Source: Survey result

Out of the total sample of 90 respondents, 48 were male (53.3%) and 42(46.7%) were female. Regarding to marital status, 53.3% of respondents were married and the rest (46.7%) unmarried. Level of education among the sampled respondents is more or less similarly distributed. 41.1% of respondents had at least a first degree and above while 58.9% of the respondents had lower level of education.

Information on monthly income of the respondents was collected in categories. 70% of respondents reported that they have low monthly income and 30% of the respondents have higher income.

Table 4.6: Cross tabulation of respondents' knowledge about Wildlife and WTP answers

WTP answers for the two bid prices(1^{st} bid price - 2^{nd} bid price)		Knowledge about wild life (KW)		Total (%)
		I have no knowledge about wildlife (%)	I have enough knowledge about wildlife (%)	
Yes-Yes	Within KW	11.1	30.6	
	From Total	2.2	24.4	26.7
No-No	Within KW	88.9	6.9	
	From Total	17.8	5.6	23.3
No-Yes	Within KW	0	25	
	From Total	0	20	20
Yes-No	Within KW	0	37.5	
	From Total	0	30	30
Total (%)		20	80	100

Source: Survey result

Table 4.6 depicts respondents WTP answers for the two bid prices. 26.7% of the respondents agreed to pay for the designed both bid prices "Yes-Yes" while 23.3% of the respondents denied to pay for both bid prices "No-No". Conversely, "Yes-No" and "No-Yes" WTP answers for the two bid prices accounts 30% and 20%, respectively. In total, 56.7% and 46.7% of respondents were willing to pay for the first and second bid prices, respectively. The total "Yes-Yes" response for both bid prices is 76.7%, which shows that the selected bid prices used for the main survey worked out well.[14]

The table also shows that 80% of the respondents reported that they had good knowledge about wildlife and out of which only 6.9% of the respondents were not willing to pay for both bid

[14] Using Kernel density estimation for the stated WTP five WTP bid prices was identified 5, 10, 15, 20 and 30 ETB from open ended WTP elicitation format and almost three quarter of the respondents showed their willingness to pay.

prices. On the other hand, 20% of the respondents reported that they did not have knowledge about wildlife and hence with a high number of "No" responses (88.9%) for both WTP bid prices. It can thus be concluded from the results that knowledge about wildlife has impact on individuals' willingness to pay for a specific bid prices.

Table 4.7: Cross tabulation of respondents attitude toward non use value of wildlife and WTP answers

Non use values	Answer for bid price or WTP				Total (%)
	Yes-Yes (%)	No-No (%)	No-Yes (%)	Yes-No (%)	
Option value	28.9	21.7	17.1	27.7	95.4
Benevolence value	26.5	16.9	16.9	24.1	84.3
Bequest value	26.5	18.1	16.9	22.9	84.3
Intrinsic value	28.7	21.7	19.3	26.5	96.2
Stewardship value	26.5	18.1	18.1	26.5	89.2

Source: Survey result

The percentages of responses to non use value and motivational questions are presented in Table 4.7. Respondents were asked to indicate the importance of different reasons for holding economic values for wildlife protection. Options, altruistic, bequest, benevolence, and rights-based values were some of the specific motivations. Overall, the respondents strongly recognized different non use values related to conservation of wildlife at Addis Zoo Park. This question was intended to gauge respondents' attitude towards conserving wildlife to promote tourism industry. For all non use value questions, more than 50% of the respondents appreciated the statement. This is the recognition of non consumptive use value of wildlife and its

conservation. Among the five motivations considered the benevolence and the bequest motives of maintaining wildlife for the future generation appears to be least important. The relative importance of motivations associated with intrinsic, option, and Stewardship values appear fairly similar. The most important motivation corresponds to the statement: "All endangered species in Addis zoo park have a right to exist'', indicates a rights-based or ethical belief. Based on this stratification, positive willingness to pay is found to be significantly related to the way respondents rate the importance of non use motivations.16.9% of the respondents who had benevolence motive rated zero willingness to pay for the two WTP prices. This comprises the smallest share from the total number of respondents who had zero willingness to pay for both bid prices.

Table 4.8: Cross tabulation of way of payment and WTP answers

Mode of payment	Answer for bid price or WTP (AB)				Total (%)
	Yes-Yes (%)	No-No (%)	No-Yes (%)	Yes-No (%)	
I will pay with bank account	0	1.1	1.1	3.3	5.6
I will pay with my Idir book	3.3	2.2	2.2	1.1	8.9
Include with my monthly electricity bill	1.1	1.1	2.2	1.1	5.6
Include with my monthly water bill	3.3	0	3.3	1.1	7.8
Deduct from my salary	16.7	11.1	6.7	14.4	48.9
Unwilling to pay	2.2	7.8	4.4	8.9	23.3
Total (%)	26.7	23.3	20	30	100

Source: Survey result

Mode of payment in the contingent valuation studies is necessary in getting information on how to collect the designed bid prices. To avoid Vehicle biases, the study uses a lump sum price which is not based on income or tax rate. Table 4.8 shows the respondents payment of vehicles. Out of 76.7% of respondents who had positive WTP for both or for one of the bid prices, almost half of the respondents preferred to contribute to wildlife protection a lump sum amount that would be deducted from their salaries. A small number of respondents preferred to pay through bank account and with their monthly electricity and water bill.

4.2 Econometric Analysis

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

4.2.1 Estimation of the Recreational Demand for the Use Value of Wildlife

Recreational demand function at a given site is related to the number of trips made by an individual and trip price or personal preference. The non-negative and integer nature of trip demand suites the count data model to estimate recreational benefits. The application of count data model to assess recreation site demand by adopting on-site survey encounters the problems of asking the frequency of visits and truncated non-user samples. So, the study follow Shaw's (1988) on-site Poisson model to correct for these two evaluation problems. Moreover the study

employed semi log functional form to estimate the recreational demand of the site. The total travel cost and other socio-economic variables are included in the model as independent variable. Total travel cost contains transportation costs of visitors, converting round-trip distance from home to destination site into ETB and opportunity cost of time. Without estimating travel time for a recreation site, the consumer surplus of benefits will be underestimated. The functional relationship is presented below:

$$Ln\,(y*+1) = \beta_0 + \beta_1 T\,cost + \beta_2 Income + \beta_3 travel\,distance + \beta_4 SUP + \beta_5 \text{group} + \beta_6 \text{RSW} + \beta_7 \text{age} + \in_i \quad (15)$$

(For computational reason one trip is added to all visitors)[15]

Where, $Ln\,(y*+1)$ = the expected number of trips (in logarithm) which is the dependent variable.

T cost= the sum of travel cost and time cost of travel including a return in ETB[16] [17]

Income= monthly income of visitors in ETB

Travel distance= total travel distance in kilometers, including a return

RSW= relationship with wildlife as dummy variable (1= relationship with wildlife, 0= no relationship with wildlife)

Age= visitors age

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

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

[17] The study also assumed average speed of driving for all cars (50 km/per hour) to arrive to the park.

Group= travel characteristics as dummy variable (1=group, 0=single)

Sup= the number of people that the respondent supports

β_0= constant term

ϵ_i = residual term which has a normal distribution with mean zero and variance δ^2

The primary aim of travel cost method is finding the use value of recreational demand benefits and computation of consumer surplus for each recreational trip. The appropriate recreational demand function is derived from the regression result between the expected number of trips and travel cost. The robust regression result from truncated Poisson model is presented in table 4.9 below.

Table 4.9: A maximum likelihood estimation of the truncated poisson regression (Dependant variable = number of visits)

Explanatory variable	Expected coefficient Sign	Truncated Poisson coefficient	p-value	Marginal Effect	Mean Value
Distance Travel	-	-0.003 (0.006)	0.647	-0.006	10.332
Sup	-	-0.112 (0.049)	0.023**	-0.227	1.114
Age	-	0.007 (0.012)	0.528	0.015	27.563
Income	+	0.0001 (0.0001)	0.082*	0.0002	1632.089
Total travel cost (T cost)	-	-0.026 (0.006)	0.000***	-0.052	22.624
RSW	+	0.034 (0.152)	0.824	0.069	0.158
Group travel	+	0.064 (0.122)	0.602	0.129	0.563
Constant		1.044 (0.299)	0.000	N/A	N/A

Source: own computation

* 10percent level of significance

** 5 percent level of significance

*** 1 percent level of significance

Numbers in parenthesis are standard errors N/A= not applicable

The truncated Poisson model is selected as an appropriate model that fits our data because of the absence of over dispersion problem. Over dispersion occurs when the variance is larger than the mean for the data. This may be due to few respondents making a large number of trips while most respondents making only a few. The mean of the visitation which is 2.533 is higher than the variance of the visitation 0.847, an indication of absence of the over dispersion problem (see appendix A.1 for summary statistics). Furthermore test of over dispersion was made and the result shows that the dispersion coefficient alpha (ά) is $9.99e^{-24}$ and the p-value fails to reject the null hypothesis that says the value of alpha equal to zero or there is no over dispersion problem (See appendix A.4).

Moreover, log-likelihood ratio test and the pseudo-R^2 value are used to test the significance of the model.

The pseudo-R^2 values are calculated as:

$$R^2 = 1 - \frac{lnL}{lnL0} \qquad (16)$$

Where lnL is the log-likelihood of the full model and lnL0 is the log-likelihood of a model with the restriction of all coefficients are zero (β= 0). The pseudo R^2 for truncated Poisson model is 10.87% but still this value is better than other count data models (see appendix A.5 for comparative analysis between other models).[18]

The log-likelihood ratio (LR) test is formally more preferred to test the significance of the model. The log-likelihood ratio test estimated as follows:

$$LR = -2(Restricted\ Log - Unrestricted\ Log) \qquad (17)$$

[18] This measure of fit is not comparable to ordinary least squares R^2, but still provides an indication of the improvement of the fit of the model over a restricted model with only a constant term.

Where the restricted log is the log-likelihood only with constant and the unrestricted log is the log-likelihood of the full model. The calculated LR chi $^2(7)$ is 50.82 and the critical value of the test with 7 degrees of freedom ($\chi 2_{7}$) at one percent significant level is 20.09. The calculated value is higher than the tabulated value at one percent significant level. Therefore, the likelihood ratio statistic test models goodness-of –fit under the null hypothesis that all parameters are zero can be rejected. Again, the LR test of the truncated Poisson model is better than other model (see appendix A.5).

4.2.1.1 Determinants of Recreational Demand for the Use Value of Wildlife

The demand function of the independent variables includes Travel cost, Travel distance, Income, SUP, RSW and age. It is expected that travel cost, travel distance, SUP and age are negatively correlated with the number of visits; and income, group and RSW positively correlated with the number of visits.

The most important coefficients in this study for the purpose of gaining consumer surplus measures is the travel cost. The travel cost is the sum of all travel cost expenses including the travel time cost. The travel cost coefficients have registered the expected signs, negative sign, and is significant at 1 per cent significance level. The travel cost coefficients are consistent with the demand theory, which stipulates that when the price of travel increases then the number of visits will decrease. The negative sign is expected because as the costs of travel to the site increase, one is expected to take fewer trips per annum, ceteris paribus (given a fixed level of income). An increase in the travel cost by one birr will decrease the number of visits made to

the site approximately by 5%. This means that people living closer to the site made many trips while those living far from the site made fewer trips.

Visitors' monthly income is also considered as one of the main variables that affects the number of visits positively. This seems reasonable, because when the income of an individual increases then the individual might be willing to substitute wage for leisure. On the other hand it is natural that people are willing to pay more for normal goods when their income increases. As described in table 4.9, the coefficient for income is significant at 10% significant level. As the income of the visitors' increases by one birr then the number of visits are expected to increase by 0.01%. However, the marginal effect of income on number of visits is very small which is due to the reason that the entrance fee to the park is very small, which is two birr. As shown in the appendix section, many visitors who made many trips are those who come from places near the site and therefore, they value their on-site expenses including entrance fee for their decision to visit or not (see appendix A.2). The onsite expenses are very small including the entrance fee which weakens income as the main determinant variable on the number of visits. As visitors income increases to higher level people also prefer clean and attractive environment during their time of visits. But as it illustrated in the appendix section almost 50% of high income group visitors are dissatisfied because of the environment and they made very small number of trips (see appendix A.3). For reasons outlined above, monthly income of visitors is an important variable but has a very small effect on the decision to make more or fewer trips.

Similarly, the variable SUP also registered the expected sign and significant level. The variable SUP is significant at 5% significant level. As the number of people an individual is supporting increases then the number of visits that he/ she makes will decrease and this is also consistent

with the theory of demand. When a visitor decides to support one more individuals at the margin then his willingness to visit the park will decrease by an approximate value of 22%. The first thing to note about this result is that, the magnitude is very large which could be because of two reasons. First when an individual supports his household members, he is devoting his income that might be used for visits and as a result the number of visit will decrease since the two goods are very competitive. Second, most importantly when an individual supports his household members, he is also scarifying his leisure time. This indicates that the variable SUP affects the number of visits from two directions.

The estimate of the RSW, distance travel and group coefficient produced the expected sign, but the estimated effect of the variable age did not. However, all these variables are not significantly different to zero.

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

The study uses the estimated coefficient of travel cost to calculate the welfare measures. Basically there are two steps to arrive at the final welfare of the visitor. The first step is estimating the demand relationship for the recreational benefit. This is done by relating the number of visit with the travel cost.

The linear semi log travel cost model hypothesis is:

$$\ln(y_i) = \beta_0 - \beta_1 Travel\ cost_i + \in_i \quad (18)$$

Where:

y_i= individual i's annual visits to Addis zoo park

$Travel\ cost_i$ = Travel cost for individual i measured in ETB

β_1 = The constant term

β_0 = coefficient of the travel cost

$\in_i$ = residual and which has a normal distribution with mean zero and variance δ^2

The estimated demand function for Addis Ababa lions Zoo Park can be expressed as:

$$y = e^{1.04-0.52TC} \quad (19)$$

The second step in the estimation of the welfare of an individual for a trip is finding the area under the estimated demand function which gives the recreational benefit flowing to each individual. The area of this demand function is estimated by integrating the inverse demand function between zero and the average number of visit 2.5 (see appendix A.1 for summary statistics). The result from this estimation gives the recreational value for average number of visits. Table 4.10 gives the result of the above estimation.

Table 4.10 Result of recreational value estimation and consumer surplus

Recreational value for average visit	Recreation value per trip	Average consumer surplus per trip
52.375 ETB	20.95 ETB	10 ETB

Source: Own computation

As shown in table 4.10, the recreational value for the average visit for truncated Poisson model is 52.375 ETB. Therefore the recreational value of the site per visit per person is estimated to be approximately 21 ETB. The annual report of Addis Zoo Park shows that the total number of visits to Addis Ababa lions Zoo Park in the last 12 months is 560,347 visits. Therefore, the annual on site recreational value can be found as follows

21 ETB x560, 347 visit = 11, 767,287 ETB

The last task in the measurement of welfare is finding consumer surplus. Consumer surplus is a widely accepted measure of net social benefit. It represents the difference between an individual's willingness to pay and actual expenditure for a good and service. With count data models, the procedure most often used is to calculate per trip consumer surplus (Creel and Loomis 1990). Per trip measure can be multiplied by the estimated number of trips in a year to obtain the aggregate consumer surplus of access to a given site or sites, in general or for a specific activity. The method establishes a relationship between the costs (the price) incurred by travelers to a site and the number of trips taken. This relationship is further exploited to derive Marshallian Consumer Surplus (CS) for access to the park for recreation experiences, by integrating the area under the demand recreation curve and above average travel cost 22 ETB. The result for average consumer surplus per visit as depicted in the table 4.10 is 10 ETB. Aggregate consumer surplus is obtained by multiplying the per trip consumer surplus of the visitors for the total number of 560, 347 visits for the last 12 months, which is approximated to 5,603,470 ETB (see appendix A.6 for comparing the recreational value and consumer surplus with other models).

4.2.2 Estimation of the Willingness to Pay for the Non Use Value of Wildlife

The non use value contribution of wildlife is formally found by relating an individual's willingness to pay with the designed bid price and other socio-economic variables. In this section we describe how the data collected from the contingent valuation surveys was analyzed and present some of the results of this analysis using seemingly unrelated bivarite probit model. The model uses responses from the survey to judge exactly how different factors, such as income or bid prices, influence a household WTP for wildlife conservation. This part also finds the mean WTP of individual for the non use value of wildlife. The first WTP bid price answers and the second WTP bid price answers are the two dummy dependant variables. The study uses a linear- linear functional form after making a preliminary specification test. This functional form is better than the semi-log or the log-log functional form because of the dummy nature of the data. The functional relationship is presented below:

$$Y_1=\beta_0 + \beta_1 FBP + \beta_2\, age + \beta_3\, SUP + \beta_4 RSW + \in_i \quad (20)$$

$$Y_2=\beta_0 + \beta_1 SBP + \beta_2\, age + \beta_3\, SUP + \beta_4 Income + \in_i \quad (21)$$

Where;

Y_1= WTP answer for the first bid price as dummy variable (1=agreed to pay for the first bid price, 0= denied to pay the designed bid price)

Y_2= WTP answer for the second bid price as dummy variable (1=agreed to pay for the second bid price, 0= denied to pay the designed bid price)

FBP= the first designed bid price in ETB

SBP= the second designed bid price

RSW= relationship with wildlife as dummy variable (1= relationship with wildlife, 0= no relationship with wildlife)

Age= respondents age (measured in count number)

Sup= the number of people that the respondent is supporting (measured in count number)

Income= monthly income of the respondent in ETB

β_0= constant term

$\in_i$ = residual term which has a normal distribution with mean zero and variance δ^2

The contingent valuation method helps to find the non use value contribution of wildlife by asking indirectly individuals willingness to pay for the conservation of wildlife. The econometric model is presented to determine some of the socio economic factors that affect WTP for the non use value part of wildlife. A preliminary regression was run to determine the relevant explanatory variable and test of specification was conducted and finally a seemingly unrelated bivarite probit model is selected and presented for this study. The robust regression is presented in table 4.11.

Table 4.11: The robust Seemingly Unrelated Bivarite Probit Model regression result

Explanatory variable	1st bid answer (Y1)			2nd bid answer(Y2)			Marginal Effect
	Expected Coefficient sign	Coefficient	P-values	Expected Coefficient sign	Coefficient	P-values	
FBP	-	-0.039 (0.019)	0.047**				-0.015
SBP				-	-0.012 (0.013)	0.342	-0.005
Age	+	0.069 (0.028)	0.015**	+	0.120 (0.036)	0.001**	0.074
Sup	-	-0.077 (0.082)	0.353	-	0.029 (0.084)	0.732	-0.017
Income				+	1.036 (0.634)	0.100 *	0.378
RSW	+	2.049 (0.591)	0.001**				0.324
Constant	-	-2.822 (1.031)	0.006		-4.257 (1.173)	0.000	N/A

Source: Own computation

* 10percent level of significance

** 5 percent level of significance

*** 1 percent level of significance

Numbers in parenthesis are standard errors N/A= not applicable

To select the appropriate model, first the study checked the significance level of rho (ρ), which shows the correlation between the two WTP answers. The LR test for row ($\chi 2=27.4$) suggests that the two disturbances are significantly correlated. The estimated correlation (row) -1 is far away from zero and which is statistically discernable, so the probability in which the null

hypothesis of no correlation is rejected. Therefore, the first and second bid answers are jointly determined. So the two equations may be analyzed by Seemingly Unrelated Bivarite Probit model or Recurrcive Bivarite Probit model. However, a regression of the two equations separately will result in inconsistent results because the correlation between these two dependent variables is rejected. The model specification test shows that the model estimated using the Seemingly Unrelated model fits better the data than the Recurcive Bivarite Probit or Independent Probit model (see appendix B.2).

To test the significance of the SUBP model the log-likelihood ratio test and the pseudo-R^2 value are used. The computation of pseudo-R^2 and LR test is similar to the one presented in the previous section. The computation result for pseudo R^2 is 46.6% and for the likelihood ratio test, the calculated LR chi $^2(6)$ is 44.72 and the critical value of the test with 7 degrees of freedom ($\chi 2_{6}$) at one percent significance level is 18.4. The calculated value is higher than the tabulated value at one percent significance level. Therefore, the likelihood ratio test of goodness-of –fit under the null hypothesis that all parameters are zero can be rejected. For reasons outlined above the seemingly unrelated bivarite probit model fit the data well than other Probit models.

4.2.2.1 Determinants of Willingness to Pay for the Non Use Value of Wildlife

Table 4.11 shows the effects of the bid prices and different socio economic factors on respondents' willingness to pay. As shown in the table there are two dependant variables, the first bid price answer and the second bid price answer, each taking the dummy variable 1 for agreement for the designed bid price and 0 for the refusal to the designed bid price.

As it was expected for the first bid price answer, all explanatory variables; the first bid price, age, RSW, and SUP registered the expected sign. For the second bid price except SUP all explanatory variables registered the expected sign.

The first bid price as expected is found to be the main variable that affects WTP. The first bid price is significant at 5% significant level. When an environmental authority increase the first bid price by one birr, then the probability of the respondent's willingness to pay for the conservation of wildlife decreases by 0.015, holding other variables at the given levels. This marginal effect is very small and it shows the irresponsive nature of the price on WTP answer and this is because of the small amount of bid price. It is consistent with the theory of demand. As shall be described in the later section, the mean WTP of individuals for the conservation of wildlife is 8.61 ETB per annum which is a very small amount. Therefore, any change in bid price will have an inverse effect on the first WTP answer but its effect is not large.

Individual's relationship with wildlife also registered the expected sign and significance level. This variable significantly affects the first WTP answer at 1% significant level. Relationship with wildlife can be explained in terms of membership in wildlife and environmental associations, frequent visits of wildlife protecting areas, level of education related with wildlife and other. So when an individual has a relation with wildlife he/she is willing to pay for a specific amount of money since he/she knows the relevance of wildlife to the current and for the coming generation. Therefore, any advertisement about wildlife is likely to improve people's attitude toward the protection of wildlife.

Respondent's income, which is a dummy variable of high income group and low income group, is expected to affect respondent's second WTP answer positively. As expected, this variable also registers the expected sign and it is significance at 10% significant level. This seems reasonable for when monthly income of an individual increases then his willingness to pay for the non use value part of wildlife will increase.

The last variable which registered the expected sign and significance level is age of the respondents. The age of the respondent significantly affects both the first and second bid price WTP answers at 1 % significant level. Broadly speaking as the age of an individual increases then his/her attitude toward wildlife is likely to change. When individuals' age increases they realize that conservation of wildlife is very important to ensure high non use value to the future generation in terms of climate modeling and environmental scenic. So they are more likely to be willing to pay for the conservation of the wildlife.

The estimate of the second bid price on the second WTP answer and SUP on the first WTP answer coefficient produces the expected sign, but the estimated effect of the variable SUP on the second WTP answer does not. However, all these variables are not significantly different from zero.

4.2.2.2 Estimation of the Mean WTP

The econometric model describes how decisions concerning WTP can be used to estimate the average WTP in the population. The mean WTP estimation was made using the two WTP bid price answers. The estimation was conducted in two steps. The first step was estimation of the

model using seemingly unrelated bivarite probit model. The second step is finding the mean WTP. To estimate the mean WTP the study resort to simulating confidence intervals with the Krinsky Robb procedure. The Krinsky Robb method uses random draws from assumed multivariate normal distribution to generate new parameter vectors. WTP is then calculated for each of these parameter estimates and they are used to construct the WTP distribution for the complete set of replications. The estimated mean WTP and the confidence intervals are presented in Table 4.12.

Table 4.12: Reporting Krinsky Robb estimation results of mean WTP

Mean WTP	LB	UB	P-value	Mean CI	Difference
8.61	7.07	11.11	0.0000	0.47	4.04

Source: Own computation

As shown in table 4.12, the mean WTP is 8.61 ETB per annum. It is bounded between 7.07 birr and 11.11 ETB. This value is significant even at 1% significance level with p value 0.000. The variation between the lower and upper bound is very small 4.04 as compared with other Probit models (see appendix B.3). As is quite evident the SUBP model is relatively more efficient than the Independent Probit and the Recurrsive Bivarite Probit models as it has tighter confidence intervals around the point estimate. It is confirmed that the statistical gain of the other Probit models is negligible for this particular data. Thus, the claim of improved efficiency of DBDC over SBDC models is justified. The result of Bateman, Langford, Jones and Kerr (2001) conforms to this finding. The double-bounded dichotomous choice CV model is asymptotically more efficient than the single-bounded model. And the confidence intervals for summary measures such as WTP were greatly reduced by using the double-bounded model.

Therefore; the mean WTP for one person per annum for conservation of wildlife is 8.61 ETB and when multiplied with the total population, the total non use value of Addis zoo park wildlife is reached. According to the Ethiopian 2009 population census report, from the total population of Addis Ababa 2,917,295 people 1,993,105 people are aged over 18. This can be taken as the desired population. The estimation result of 1,993,105 people x 8.61 ETB gives 17,160,634 ETB per annum. This value is the total nonuse value contribution of wildlife.

The total economic value of Addis Ababa lions Zoo Park is therefore found by the sum of the use value and the non use value of the site. Based on the above finding the use value contribution of wildlife was estimated to be 11, 767,287 ETB and the non use value of wildlife of the site is 17,160,634 ETB per annum. Therefore; the total economic value of the park is estimated to be 28,927,921 ETB.

CHAPTER FIVE

CONCLUSION AND POLICY IMPLICATIONS

This study analyzed the total economic value of Addis Ababa Zoo Park. This has been necessitated because of the economic importance of the development of tourism. Specifically, the tourism industry provides a number of economic returns in the form of foreign exchange earnings, employment generation, individual income and government revenues. In this regard, the potentials for using wildlife as an instrument for economic growth and development are quite enormous. However, these have not been fully explored both in Ethiopia and in other developing countries. Although some developments have been recently witnessed in the sector, wildlife is still largely considered from the limited aesthetic and touristic functions. In this respect, valuation can show, and quantify, the actual and potential contribution of wildlife to national economic growth, employment and income, to local livelihoods, to commercial profits and to industrial activities; and has shown how this information can be used to influence and mainstream development decisions and economic indicators.

This study attempted to measure the use value and the non use value of wildlife through the employment of the travel cost method and the contingent valuation method, respectively.

The use value of wildlife estimated from data collected through the TCM, which helped to find the current recreational benefit of the park and the non use vale part of wildlife estimates, uses data from the CVM scenario which help to find the future recreational opportunity and this can be explained by the amount of money that people are willing to pay to protect existing wildlife, since without this protection, the quality of future recreation resources might diminish. The

study is based on SUBP model to estimate the use value of wildlife and TP model to estimate the non use value contribution of wildlife as the appropriate models after making comparison with other models.

The regression results showed that travel cost, monthly income and SUP are important determinants for the recreational demand of the site. On the other hand, willingness to pay for the non use value part of wildlife is found to be affected by the first bid price, monthly income, RSW and age.

The study found that the use of follow up response helps in generating better estimates of mean WTP because it provides better information content. The estimated mean WTP of SUBPM is more efficient and robust than those obtained from Recurrcive Bivariate Probit Models and Independent Probit Model. The study evaluates the mean WTP for existing resources using the estimated results. On average, WTP for conservation of wildlife is positive and it is approximated to 8 ETB and the annual WTP is around 17,160,634 ETB per annum. To generalize, those results strike an optimistic note on the possibility of measuring the non use value of wildlife. However, further research is necessary to establish the validity of this assertion since the study used a sample of relatively small size.

The study also discussed the simulation experiments carried out to compare the single and double bound estimators. Based on those parameter estimators, the study found that willingness to pay estimates for the single bounded model was double the size of the double-bounded models. It was then suggested that dichotomous choice elicitation procedures are better than open ended elicitation method. The claim of increased efficiency of DBDC over SBDC

Contingent valuation surveys relied on achieving tighter bounds on mean WTP estimates from the first response equation.

The TCM is used extensively to value non-commercial outdoor recreational sites which have nominal access fees to inform decisions to invest in public recreation sites. Using travel cost method, the study attempted to quantify the benefits associated with the non-consumptive use of Addis Ababa Zoo Park. To increase number of visitors to the park while there is lack of awareness among visitors on the importance of wildlife, the results of the study could be useful to park management in setting appropriate conservation fee.

For TCM, an on-site truncated Poisson model of TCM is adopted to evaluate the use value of wildlife by calculating the consumer surplus. As estimated by the count data model, the study found the mean consumer surplus per trip to be 10 ETB. This demonstrates the magnitude of benefit provision by visitors and some proportion of revenue foregone at current pricing rates. This surplus represents only one category of total recreational value but it is sufficient to overturn approximate estimates of the opportunity cost. And the total recreational value of the park is approximately estimated to be 11, 767,287ETB per annum and the total recreational benefit or consumer surplus is estimated to be 5,603,470 ETB per annum. The study results also reveal that the total economic value of wildlife for Addis Ababa Zoo Park including use and non use values is 28,927,921ETB per annum. Those results confirm to priori expectations regarding the motivations behind support of wildlife protection. Based on the survey results and of previous findings reported in the literature, non-use values seem to play a fundamental role in explaining people's attitudes towards the preservation of wildlife.

The study also showed that visitors to Addis Ababa Zoo Park are willing to pay up to 10 ETB, which is more than the current entrance fee. However, the result of the study proved that the total amount that the recreational site authority collects through entrance fee from visitors does not reflect the actual consumer willingness to pay.

The study suggests that the park authorities should increase the park's recreational benefits by raising the entrance fee up to 10ETB and expand the parks facility to extract some of the large consumer surplus enjoyed by visitors. Increasing the types of animals and plants of the zoo are also important measure to boost the use value of the park. The study also suggests two methods for collecting the total recreational benefit of the park. Entrance fee for the use value and a lump sum amount of money that would be deducted from the salary of an individual for the non use value part may perhaps be used to collect the prescribed amount of money. Thus the revenue collected from the public could be used as an additional source of finance, in addition to the limited funds allocated for maintenance and conservation of the park. Moreover, the revenue derived from the entrance fee must be earmarked for park maintenance or resource conservation efforts for a remarkable change.

The implication of this study is also important as a guideline to assist the park management or decision-makers in terms of welfare measures for the non use value part of the park in order to meet the sustainable use of wildlife through conservation activities. Knowledge about wildlife was identified as an important determinant of individual WTP for conserving wildlife. In this case, awareness creation is an important means to increase the non use value part of wildlife and it is reasonable to suggest that the park authority should increase these values through advertisement. The result of this study may also be incorporated in the economic analysis for

determining the viability of conserving wildlife of the park in the long run. However, future research is necessary to fully examine the robustness of the welfare values derived from the park to be used for management decision in the long run. This study suggests that future studies can be conducted on the non use value of Addis Zoo Park in order to confirm this finding. Besides, sensitivity test to alternative ways of measurement and estimation of opportunity cost of travel time can be potential areas for further researches.

Furthermore, the estimated benefits obtained from this study can be transferred to other similar parks for the purpose of policy or management decisions to affect the target resources.

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Appendix A: Estimation results for TCM

Appendix A.1: Summary statistics for TCM data

Variable list	Observation	Mean	Standard Dev	Min	Max	Variance
ln(visit)	158	2.533023	0.9205322	N/A	N/A	.8473796
Travel Distance	158	10.33228	15.94723	0.5	90	254.314
SUP	158	1.113924	1.543322	0	6	2.381843
Age	158	27.56329	6.08688	18	47	37.05011
Monthly Income	158	1632.089	1152.599	0	6,000	1328484
Total cost	158	22.62345	13.02738	0	40	169.7127
RSW	158	0.1582278	0.3661149	0.693147	4.394449	0.1340402
Group	158	0.5632911	0.4975551	N/A	N/A	.2475611

Source: Own computation

Where N/A is not applicable

Appendix A.2: Cross tabulation of number of trips and distance travel

Distance travel	Very small number of trip	Small number of trips	Medium Trips	High number of trips	Very high number of trips
Short distance travel	53	33	25	3	2
Middle distance travel	8	5	5	0	1
Long distance travel	8	0	0	0	0

Source: Own computation

Appendix A.3: Cross tabulation of visitors and visitors reasons for small number of trips

Income of visitors	Total Income share	Visitors dissatisfaction			
		Expensive	Crowded and dirty environment	Unsafe	Unavailability of endemic wildlife
Low income	66%	2.9%	42.7%	7.8%	46.6%
Middle Income	22.4%)	0%	28.6%	20%	51.4%
High Income	11.5%)	5.6%	50%	5.6%	38.9%

Source: Own computation

Appendix A.4: Regression results in five different count data models for travel cost method

Explanatory variable	Expected coefficient sign	Coefficients estimated				
		PM	TPM	NBM	TNBM	STNBM
Distance Travel	-	-.0002751 (0.952)	-.0028882 (0.647)	-.0002751 (0.952)	-.0028882 (0.647)	-.0031814 (0.758)
Sup	-	-.0684817 (0.069)*	-.1119312 (0.023)**	-.0684817 (0.069)*	-.1119312 (0.023)**	-.1335608 (0.013)**
Age	-	.0034461 (0.726)	.0073462 (0.528)	.0034461 (0.726)	.0073462 (0.528)	.0085998 (0.512)
Income	+	.0000718 (0.129)	.0000933 (0.082)*	.0000718 (0.129)	.0000933 (0.082)*	.0001138 (0.059)*
Total travel cost	-	-.0182413 (0.000)***	-.0255425 (0.000)***	-.0182413 (0.000)***	-.0255425 (0.000)***	-.0309736 (0.000)***
Relation with wild life	+	.0238691 (0.858)	.0337166 (0.824)	.0238691 (0.858)	.0337166 (0.824)	.0407355 (0.819)
Group travel	+	.0454651 (0.663)	.0636776 (0.602)	.0454651 (0.663)	.0636776 (0.602)	.0773427 (0.573)
Constant		1.136469 (0.000)***	1.043352 (0.000)***	1.136469 (0.000)***	1.043352 (0.000)***	.7058323 (0.037)***
Alpha				1.26e-15	9.99e-24	4.4
Likelihood-ratio test of H0:alpha=0			chibar2(01)	0.00	0.00	
			Prob>=chibar2	1.000	1.000	

Source: Own computation

Where: PM is Poisson model

TPM is truncated Poisson model

NBM is negative binomial model

TNBM is truncated negative binomial model

STNBM is stratified truncated negative binomial model

Numbers in parenthesis are p-values

Where:

*** 1percent level of significance

** 5 percent level of significance

* 10 percent level of significance

Appendix A.5: Comparative analysis between five count data models

	PM	TPM	NBM	TNBM	STNBM
LR chi2(7)	33.36	50.82	33.36	47.15	46.32
Prob > chi2	0.0000	0.0000	0.0000	0.0000	0.0000
Pseudo R2	0.0676	0.1087	0.0676	0.1017	N/A
AIC	476.2004	432.5923	476.2004	432.5923	408.3062
BIC	500.7012	457.0931	500.7012	457.0931	435.8696

Source: Own computation

Appendix A.6: The estimated recreational values and consumer surplus in different model

Models	Recreational value for average visit	Recreation value per trip	Average consumer surplus per trip
PM	73.48	29.392	14
TPM	52.375	20.95	10
STNBM	59	32.25	15

Source: Own computation

*Where the result of PM and NBM; and the result of TPM and TNBM are similar

Appendix B: Estimated Results for CVM

Appendix B.1: Summary statistics for CVM data

Variable list	Observation	Mean	Standard Dev	Min	Max	Variance
First bid	90	15.77778	8.738109	5	30	76.35456
Second bid	90	17.97222	13.09481	2.5	60	171.4739
SUP	90	2.822222	2.144121	0	10	4.597253
Age	90	34.8	10.62454	19	73	112.8809
Income	90	N/A	N/A	N/A	N/A	N/A
First answer	90	N/A	N/A	N/A	N/A	N/A
Second answer	90	N/A	N/A	N/A	N/A	N/A

Source: Own computation

Where N/A is not applicable

Appendix B.2: Regression result in different probit models for comparative purpose

Explanatory Variable	First answer as dependant variable			Second answer as dependant variable		
	Independent Probit	SUBPM	RBPM	Independent Probit	SUBPM	RBPM
First bid	-.0991498 (0.000) ***	-.0394387 (0.047)**	-.0440324 (0.084)*			
Second bid				-.0589526 (0.005) ***	-.0120939 (0.342)	-.0194175 (0.216)
First answer						-.3449265 (0.238)
Age	.0313589 (0.413)	.068492(0 .015)***	.0972692 (0.000)***	.1132192 (0.007) ***	.1204413 (0.001)***	
SUP	.0048282 (0.965)	-.076488 (0.353)	-.0252257 (0.616)	-.05056 (0.666)	.0288499 (0.732)	
Income	1.650703 (0.019) **			1.508745 (0.078) *	1.035958 (0.10) *	2.462495 (0.00)***
RSW	1.775518 (0.007)***	2.04855 (0.001)***	1.995936 (0.001)***			
Constant	-1.047421 (0.413)	-2.822008 (0.006)	-3.82523 (0.000)	-2.727419 (0.049)	-4.256665 (0.000)	-.3006233 (0.189)
Test of correlation between the two dependant variable					SUBPM	RPM
Wald test of rho=0 With H0: no correlation H1: there is correlation				Rho	-1 9.84e-10	-1 1.11e-09
				chi2(1)	27.4135	24.6401
				Prob chi2	0.0000	0.0000

Source: Own computation

* 1percent level of significance Numbers in parenthesis are p-values

** 5 percent level of significance

*** 10 percent level of significance

Appendix B.3: Regression result for mean WTP in different probit models

Models	Mean WTP	LB	UB	ASL	Mean CI	Difference
IPM	18.10	14.84	22.70	0.0000	0.43	7.86
SUBPM	8.61	7.07	11.11	0.0000	0.47	4.04
RBP	6.49	-1.84	11.81	0.0510	2.11	13.65

Source: Own computation

Appendix C: Questionnaires

Appendix C.1: Questionnaires on use value of wildlife using TCM questionnaire format

The purpose of this study is to find the use value contribution of wildlife at Addis Ababa lions Zoo Park. This is purely an academic research and has nothing to do with governmental or non- governmental organization. You are selected randomly from those visitors within Addis Zoo Park. Therefore I kindly request you to give me a genuine answer for the following questions. Your genuine answer would help to bring a sustainable wildlife management through informed decision making. This survey will take about 10 minutes to complete. Thank you for taking part in the survey.

Andualem Goshu
Addis Ababa University

Interviewer's Name			
Date of Interview	Date	Month	Year(EC)
			2003
The interview started			
The interview Ended			

PART ONE: Respondent Demographic Characteristics for TCM and CVM

Code	**Age**	**Sex** **a**. Male **b**.Female	**Marital Status** **a**. Married **b**. Single **c**. In relationship **d**. Separated **e**. Divorced	**House Hold Size**	**Occupation** **a**. Government employee **b**. Domestic sector employee **c.** International organization employee **d**. Own business **e**. Student **f**. Unemployed	**Monthly income** **a**.0- 1068 **b**.1069-2500 **c**. 2501- 4000 **d.** 4001-10,000 **e.** more than 10,001 specify the amount**	**Educational status** **a**. 0- 12 completed **b**. certificate /Diploma **c**. Degree **d**. Masters and above	**Number of people who have income in your family**	**Number of people in your family that you support**

** The demographic characteristics is similar for both TCM and CVM

PART TWO: Travel characteristics

a. Are you or anyone else in your household member of any animal right or environmental organization? Yes ☐ no ☐
b. Have you visited zoological parks or national parks for the last five years? yes ☐ no ☐
c. If yes please specify which site …… …… … ……..
d. How many times did you visit any other wildlife protected areas in 2010……..2009……..2008……..2007……..2006…….
e. How many times have you visited Addis lions zoo park in 2010……..2009……..2008……..2007…….…2006……..
f. How many times you were planned to visit Addis Zoo Park in 2010……..2009……..2008……..2007…….…….2006……..……
a. Is there a difference between the number of trips you planned to take to Addis zoo and the actual trips you took during the last five years? Yes ☐ No ☐
b. If yes what did you think the cause of this difference (circle the appropriate answers)
    I. Income constraint
    II. Leisure time constraint
    III. Distance of the site
    IV. Due to unattractive service
    V. Due to preference to other sites
    VI. Other (please specify)……..….
g. What would you have preferred to do if you had not chosen to visit Addis lions zoo park: working at job ☐ Housework ☐ watching TV ☐ studying ☐ going to another site for recreation ☐ pottering around at home ☐ other (please specify) ……..
h. How many times do you plan to visit Addis zoo park in the next 12 months (number of times) …….
i. Which period is your preference to visit Addis zoo park: weekdays(Monday-Friday) ☐ weekends ☐ public holiday ☐

j. How much would you ask your institution if you were asked to be at your job or how much did you get if you were at your job other than visiting parks? ……Birr/ hour

k. How many hour did you work per day?..... hours

l. How did you come to Addis zoo park: own car(specify the type) ☐ …… …… bus ☐ on foot ☐ Minibus ☐ taxi ☐

PART THREE: Time and cost factor

a. Please estimate the time and distance it takes you to get this zoo from your initial point with your return included:

   I. Total time (travel time to the site + on site stay time + travel time to your) destination): …… +……..+…….=…….

   II. Total distance (travel distance to the site + travel distance from the site to your destination): ……..+…….=……. Km. alternatively specify the name of your initial point and the way of travel to Addis zoo park

   ……

b. How much did you spend on your trip to the zoo

   I. Transportation cost…….

   II. Fuel…….

   III. Food and drink……

   IV. Accommodations……

   V. Other……

   VI. Total……

PART FOUR: Characteristics of the group

a. Are you traveling with a group? Yes ☐ no ☐

b. If yes write the total members of the group ……

c. What is your social or kinship relationship with the other members of the group? Friendship ☐ Relatives ☐ colleagues ☐ Family ☐ other (please specify)……

PART FIVE: Trip activities

a. What is the purpose of this trip? Recreation ☐ Education/ scientific ☐ work ☐ other (please specify)…….

b. Have you combined visiting friends or relatives to this trip? Yes ☐ no ☐ if your answer is yes go to the next question otherwise skip to question (d)

c. How much time did you spent by visiting your friends on the same trip? ……. hours

d. Have you combined business with this trip? Yes ☐ no ☐ if your answer is yes go to the next question otherwise skip to question (f)

e. How much money did you get from that business? ……..birr

f. How many are the numbers of other substitute (similar) sites you have considered when deciding to visit Addis Zoo Park? ……

g. Do you know any other zoological park that you would like to visit instead of Addis Zoo Park? yes ☐ no ☐

h. If yes which other single zoological site do you visit frequently? …….. if you do not answer this question please skip to question (j)

i. what is the total cost to visit that site?.....Birr/visit

j. What is your most important motive behind visiting this and other wildlife protecting areas? The existence of endemic animals and plants ☐ it's green and clean environment ☐ the recreational service behind viewing them ☐ other (please specify)…… ……. …… ……

k. How would you describe your experience of Addis lions Zoo Park? (circle any one of the following)

I. Better than I expected II. As I expected III. Worse than I expected

l. Please indicate the source of your disappointment: too expensive ☐ crowded ☐ dirty ☐ unsafe ☐ unavailability of some services at the time of visit ☐ other (please specify) …….

Appendix C.2: Questionnaire on non use value of wildlife using CVM questionnaire format

The purpose of this study is to find the non use value contribution of wildlife existence at Addis Ababa lions Zoo Park. This is purely an academic research and has nothing to do with governmental or non- governmental organization. You are selected randomly from people living in your area. Therefore I kindly request you to give me a genuine answer for the following questions. Your genuine answer would help to bring a sustainable wildlife management through informed decision making. This survey will take about 10 minutes to complete. Thank you for taking part in the survey.

Andualem Goshu
Addis Ababa University

Part Two: General Questions about wildlife and Addis Zoo Park

This part is intended to elicit question about the importance of conserving wildlife at Addis Ababa Zoo Park. Since 1948 this zoo use as a shelter for different wildlife. Within the zoo there are two endemic animals: the lions Panther Leo Abyssinica and Gelada Baboon and five endemic plants. Besides, this zoo has eight additional wild animals and 105 foreign plant species'.

1. To what extent do you have knowledge about wildlife animals and plants? Very good ☐ good ☐ satisfactory ☐ ave no knowledge ☐
2. If you have knowledge how did you acquire this knowledge? From previous experience ☐ education ☐ from work ☐ rom media ☐ other (please specify) ……
3. Are you or anyone else in your household member of any animal right or environmental organization? Yes ☐ no ☐
4. Do you believe that wildlife is important? Yes ☐ no ☐
5. What is your attitude toward the conservation of wildlife? Very good ☐ good ☐ satisfactory ☐ not at all ☐

6. To what extent do you have relationship with wildlife? Very good ☐
   good ☐ satisfactory ☐ not at all ☐
7. Do you have knowledge about Addis Ababa Lions Zoo Park? yes ☐ no ☐
8. Are you interested to see Abyssinica lions and Gelada Baboon (species name) in the future?
   Yes ☐ no ☐ don't know ☐
9. Are you enjoying by knowing that other people are able to enjoy (species name) in Addis lions zoo park?
   Yes ☐ no ☐ don't know ☐
10. Do you enjoy by knowing that the future generations will be able to enjoy (species name) in Addis zoo park?
    Yes ☐ no ☐ don't know ☐
11. Are you enjoying by knowing that lions and Glada Babon exist in Addis Zoo Park even if no one ever sees one?
    Yes ☐ no ☐ don't know ☐
12. Do you believe that all endangered species in Addis zoo park have a right to exist?
    Yes ☐ no ☐ don't know ☐

Questions about Willingness to pay

Zoological garden has many advantages: it helps to protect and conserve endangered wildlife, it uses as a recreational site, creating job opportunity and as one source of income. Wildlife are also known for their scientific research, cultural, medical, and nutritional values. Now many lions in Addis Ababa lion's zoo park cubs to taxidermists because of shortage of food and shelter; and some of them died due to disease. But as it was mentioned above these lions found only in Ethiopia, in Addis Zoo Park.

13. Do you believe that conservation of wildlife especially endangered and endemic wildlife like lions and Glada Babon at Addis lions Zoo Park is important? Yes ☐ no ☐
    if your answer is yes go to the next question and if your answer is no go to question 17.

14. Are you willing to pay ……. Birr amount to conserve wildlife's/ for the non use value part of Addis Zoo Park (Keep in mind that the payment would be real and that the money could not be employed for other things).

    Yes ☐ no ☐ if your answer is no skip to question 16

15. If the conservation fees are increased by ……..Birr would you willing to pay so that you could continue to conserve Addis zoological park? yes ☐ no ☐

16. If the conservation fees are decreased to ……..Birr would you willing to pay so that you would start to conserve Addis zoological park? yes ☐ no ☐

17. If you are not willing to pay would you state why?
    a. I am not able to pay
    b. It is government responsibility
    c. I don't believe conserving wildlife is important
    d. Others (please specify)……

18. If you are willing to pay, how could you pay? (please circle any one of the following)
    a. It will deduct from my salary
    b. monthly surcharge through my water bill
    c. monthly surcharge through my electricity bill
    d. monthly payment added with Iddir charge
    e. Other (please specify) ……..

Closing: ---- Thank You for Your Time and Cooperation

Declaration

This thesis, my original work, has not been presented for a degree in any university and all the sources of material used for the thesis have been dully acknowledged.

The examiners' comments have been dully incorporated.

Declared by: Andualem Goshu

Signature: _____

Date: _____

Confirmed by: Assefa Admassie(Ph.D.)

Signature: _____

Date: _____