ESTIMATING THE OUTDOOR RECREATIONAL VALUE OF NATURAL RESOURCES: THE CASE OF LAKE HAWASSA

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ABSTRACT

Estimating the Outdoor Recreational Value of Lake Hawassa: an Application of Individual Travel Cost Method (ITCM)

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Many natural resources with great potential for outdoor recreation, in Ethiopia, are not studied well and are subject for various kinds of pollution that may even lead them to irreversible damages. Lake Hawassa, no different from this, is a source of natural attraction and a great place for outdoor recreation. But various problems and different values of the Lake are hindering its sustainability as a place where people can recreate outdoor. Hence a study of its value as an outdoor recreational area is necessary and this study uses the Individual Travel Cost Method (ITCM) of environmental valuation technique for this purpose. Therefore with the main objective of estimating the outdoor recreational value of Lake Hawassa, 155 on site visitor samples were surveyed using a face to face interview. From the results age, travel cost and income were found to be significant determinants of demand for outdoor recreation while the other socio economic variables were insignificant. Using the Truncated Poisson Model (TPM) of regression the individual and total annual outdoor recreational benefit of Lake Hawassa was estimated to be Birr 446.3626 and Birr 72,572,760.12 respectively; while the individual and total annual consumer surplus was estimated to be Birr 227.8583 and Birr 37,046,811.82. Based on the results it is suggested that both the city administration and potential investors should use the result of the study as a base for current and future investment decisions. In addition, as the health of the lake, the flora and fauna species are being endangered by pollution of various types, care has to be given by all and there should be the enactment and implementation of policies and rules that hinder polluting activities and encourage protection of the lake to make sure the sustainable use of the resource.

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LIST OF ACRONYMS

ASC	Alternative Specific Constant
CE	Choice Experiment
CEM	Choice Experiment Method
CS	Consumer Surplus
CVM	Contingent Valuation Method
HPM	Hedonic Pricing Method
ITCM	Individual Travel Cost Method
IBC	Institute of Biodiversity Conservation
OLS	Ordinary Least Squares
MWTP	Mean Willingness to Pay
MLE	Maximum Likelihood Estimation
TCM	Travel Cost Method
TPM	Truncated Poisson Model
SNNPR	Southern Nations Nationalities and Peoples Region
USD	United States Dollar
UNESCO	United Nation's Education Scientific and Cultural Organization
WTA	Willingness to Accept
WTP	Willingness to Pay
ZTCM	Zonal Travel Cost Method

CHAPTER ONE

INTRODUCTION

1.1. Background of the Study

Recreation is an activity of leisure; refreshment of one's mind or body after work through activity that amuses or stimulates; play. **It is** refreshment of health or spirits by relaxation and enjoyment or an activity or pastime that promotes this. The "need to do something for recreation" is an essential element of human biology and psychology. Recreational activities are often done for enjoyment, amusement or pleasure and are considered to be fun. The term *recreation* implies participation to be healthy refreshing mind and body. (Wikipedia, Free Encyclopedia)

Recreation is an essential part of human life and finds many different forms which are shaped naturally by individual interests but also by the surrounding social construction. Recreational activities can be communal or solitary, active or passive, outdoors or indoors, healthy or harmful, and useful for society or detrimental. (Wikipedia, Free Encyclopedia)

Indoor versus outdoor recreation: Indoor recreations are suitable for persons who are not out door and when there are bad weather conditions and other reasons. These ranges of indoor recreational activities include, reading, writing, playing cards, computer and video games, internet surfing, dance, music and other indoor games like pool, table tennis, indoor tennis, badminton, etc and can be a great way to spend time and for enjoyment. On the other hand, outdoor recreation or outdoor activity is leisure pursuits engaged in the outdoors, especially in (but not limited to) natural or semi-natural settings out of

town. Examples include hiking, camping, fishing, sailing, swimming, surfing, photographing, rock climbing, and bicycling, hunting, horseback riding, skiing and mountaineering. (Wikipedia, Free Encyclopedia)

Many natural resource systems such as lakes, rivers and streams, estuaries, and forests are used extensively by people for various kinds of outdoor recreational activities, including fishing, hunting, boating, hiking, and camping. As places to conduct such activities, natural resource system provide valuable services to people. (Freeman, 1993)

From the economic perspective, value of these services depends upon the characteristics of the natural resource system. The characteristics determining value can be affected by air and water pollution and resource management decisions. Hence knowledge of the values of these services is important for variety of resource management decisions. In addition, access for the resource for recreation is typically not allocated through markets; rather access is typically open to all comers at zero prices or a nominal entrance fee which doesn't reflect the true economic value of the resources. (Freeman, 1993)

Hence, various non- market valuation techniques have been developed by economists to value natural resources in the past few decades. From the various non- market valuation techniques economists have provided us, this study by employing The Travel Cost Method and more specifically The Individual Travel Cost Method (ITCM), have tried to estimate the outdoor recreational value of Lake Hawassa.

1.2. Description of the Study Area

Lake Hawassa is located in the Southern Nations Nationalities and Peoples Regional State (SNNPR) about 275kms south of Addis Ababa and with the coordinates $7^{0}03^{/}$ N latitude and $8938^{0}26^{/}$ E longitude. (www.snnprs.gov.et)

It is the smallest of all the Ethiopian rift valley lakes having a total surface area of surface area of 95 km^2 and a total drainage area of 1, 371.6 $km^{2.}$ Its mean depth is 11 meters while the maximum depth of the lake is 22 meters. The lake is found at a surface elevation of 1,686 meters above sea level. It is about 16kms long and 8kms wide and has an estimated volume of 1.3 billion cubic meters. (Zinabu, 2010)

The name of the lake, "Hawassa" means "big" in 'Sidaminga' language which is one of the Cushitic languages spoken in Ethiopia; and the natural beauty of the lake and the surrounding areas was the main reason for the foundation of the town Hawassa in 1954 E.C. It is one of the most beautiful natural gift of Ethiopia and famously known as the "Lake of Love" by the locals. (www.snnprs.gov.et)

A look at the lake's watershed provides that the watershed of Lake Hawassa contains four main watersheds namely the Ungauged sub catchment around the lake draining onto the surface of the lake, the Tikur Wuha sub watershed draining through the Tikur Wuha river, the Wondokosha and the Muleti closed sub watersheds. (Yemane, 2004)

Lake Hawassa is important in many ways to the livelihood of the population that lives around it. First, the commercial fishery of the lake plays an important role in alleviating protein shortage. Moreover, it is a sole source of income for the fisher men, fishing gear makers, and others that are engaged with fishing related activities. Second, the water of

the lake is suitable for irrigation and hence a considerable area of the land around the lake is under irrigation. Third, the lake is a very good site for tourist attraction and it has been used for many other domestic purposes. (Zinabu, 2010)

However, though, Lake Hawassa has the benefits that are mentioned earlier; each benefit has an attached problem to the lake.

Even though, Lake Hawassa is the smallest of the eight rift valley lakes, it contributes close to 10% of the total annual fish catch from all lakes in the country (about 7500tones/year). (Yosef, 2010)

There are six species of fish in the lake namely The Nile Tilapia (Oreochromis Niloticus L.), The African Catfish (Clarias Gariepinius Burchell), The African Big Barb (Barbus Intermidius Rapped), The Sraight Fin Barb (Barbus Paludinosus Peters), Gara Quadrimaculate and The Tiny Cyprinidonty (Aplocheilichthyes Antinorii). The first three are commercially important while the remaining three are not due to their small size nature. Among the commercialized ones, Tilapia composes most of the annual landings (85%), followed by Catfish (14%) and Barbs (1%). (Elias, 2010)

Currently the fish stocks of the lake are confounded with serious problems due to irrational fishing practices which include heavy fishing pressure, capture of immature fish that have not yet attain the size/age of first breeding and fishing breeding populations during their breeding seasons. The fishery of the lake has increased more than fivefold since the early 1990s and this has inflicted severe destruction to the Tilapia Population which is the most exploited fish stock. (Yosef, 2010)

Figure 1.1 Fishing at Lake Hawassa

Source: Official Website of SNNPR

The other importance of the lake which is the use of irrigation water from the lake is steadily increasing not only along the shoreline of the lake but also in many of the natural drainage basins that used to recharge the wetland and eventually end up in the lake. Cash crops like onion, tomato, cabbage, sugarcane, and the like are dominant crops that are grown along the shorelines and some of them are cultivated twice a year. This has an adverse effect on the volume of the lake. (Abiriham, 2010)

Lake Hawassa, also a significant regional asset, is recognized for its culture, nature based tourism product and as key provider of water base activities including boating, fishing and swimming.

Figure 1.2 Sun Set View at Lake Hawassa

Source: Official Website of SNNPR

It is recognized as one of the important bird watching areas of Africa and as a home for various migrant and resident avifauna.

Figure 1.3 Birds at Lake Hawassa

Source: Official Website of SNNPR

However the lake is facing a serious threat of pollution from domestic and industrial wastes, effluent from textile and ceramic factories, sewages from a hospital and abattoirs from urban liquid and solid waste discharges. Storm drainage from the town also drains

huge amounts of untreated wastes into the lake and lake shore areas. Human activities are the other main causes of threats of pollution for Lake Hawassa; highly aggravated by rapid population growth, village expansion and increasing urbanization. These and other prevailing problems have an overall effect of undermining the economic, recreational, ecological and social merits of the lake thereby affecting the currently flourishing lake based tourism of the city. (Almaz, 2010)

On the other hand soil erosion and land degradation problems are evident that occur throughout the catchment of the lake even though the problem is adverse in the south eastern and eastern hills of the lake because of cultivation, steep slopping marginal lands and deforestation of the escapements which have exacerbated and concentrated runoff into deep gullies. It is estimated that the rate of soil erosion into the lake is ten times greater than the soil formation rate. Presently there are eight big and twelve small gullies as water inlets to Lake Hawassa, which are flood lines that carry huge amounts of soil and sand into the lake. (Assefa, 2010)

Lake Hawassa facing all these is still a place for recreation, fishing, fish market, bird watching and site seeing. The lake side also serves as a good site for social events like weddings and other public celebrations. However, in general, Lake Hawassa having all these economic and recreational importance it is under a serious threats nowadays and it is going through some changes that may lead to irreversible environmental damage.

1.3. Statement of the Problem

The recreational activity in Ethiopia has been very low even though, as the knowledge of the researcher, there are no conclusive studies made on the outdoor recreational activities of Ethiopians and its trend. However, nowadays people in Ethiopia, especially those from the big cities are participating more and more in outdoor recreational activities and developing a habit of this outdoor recreation.

Ethiopia on the other hand owns a lot of potential natural sites as sources of outdoor recreation, of which the national parks, the different lakes and rivers and the beautiful ecosystems are the major ones. To state some, the rift valley lakes of Langano, Awassa, Shalla, Abiyata, etc and the various crater lakes of Debre Ziet; Lake Wonchi, Mt. Ziquala lake, Lake Tana and the historical Islands on Lake Tana; the Tis Abay falls especially in the Ethiopian Summer season and the Abay Gorge; various hot springs; the Dallol Depression; the Sof Omar cave; mountains, and National Parks are examples. Bird watching on Lake Shalla, caving in Sof Omar cave systems, horseback riding in the Bale mountains park, hiking on Semien and Bale mountains, and rafting on the Omo river are the very few examples of recreational activities one can do in Ethiopia. However, this being the case on the potential side there are very few investments and efforts for the development of these recreational sites so as to attract people for outdoor recreation.

Lake Hawassa is one of the eight rift valley lakes in Ethiopia and is among the first row of the places where people choose to have an outdoor recreation. Its relative nearness to the capital of Ethiopia (it is 275kms to the south of Addis Ababa and about a five hour drive on average), the cool and refreshing weather condition around the lake, the

beautiful birds that could be seen from the lake, the traditional fish market around it, the welcoming and sociable behavior of the people of the town, the attractive nature of the lake with the eye catching seen of sun set on the lake every night are the reasons why lake Hawassa is very suitable for outdoor recreation. These are also the reasons why the people of Hawassa made it a habit to invite new comers to the lake as if they were serving food and drink to their gusts.

Lake Hawassa is not only the cause for the foundation of the town Hawassa which is the capital of the Southern Nations Nationalities and Peoples regional state but it is also the base of the tourism industry of the town and the great vehicle behind its fast growth. It is because of the lake that Hawassa have those beautiful and luxurious hotels and lodges which are great investments. They serve tourists to take a rest having the beautiful view of the lake, many youngsters as source of employment and income; and the regional state in general and the municipality of the town in particular as a source of revenue.

Fishing, boating, site seeing, bird watching, photographing and eating fish are very common practices of leisure on lake Hawassa while swimming is practiced to a very little extent and almost by the local people as the lake is not as neat enough for swimming.

As Clawson et. al., (1966), have explained that population growth, and rise in income and mobility could increase the demand for outdoor recreation, nowadays, Hawassa is also serving a large and increasing number of visitors seeking outdoor recreation thanks to her beautiful and refreshing lake.

However, besides its attractive nature the lake is facing various problems. Pollution of the lake by the wastages that are drawn to the lake from factories, a hospital, the unorganized and traditional service delivering kiosks that process fish around the lake and the town;

bath taking and washing of clothes by the people; the great soil erosion of the surrounding hills caused by the continued deforestation that leads to a huge deposit of soil and sand sediments into the lake; and the various agricultural activities around the lake that needs it for irrigation are some of problems that are confronting the site as a sustainable area of outdoor recreational site.

Clawson (1959) has also explained that putting an accurate and acceptable value on outdoor recreation would be valuable in resource management in different ways. First, it would provide a means for comparing the importance of recreation with that of other uses of the same resources. Secondly, the value of the recreation to be provided by a proposed recreation site would provide one measure of the desirability of making the necessary investment in the project. Thirdly, the value of the recreation would provide a ceiling to any fees that might be charged for its use.

Therefore having an estimate of the outdoor recreational value of Lake Hawassa is very important, necessary and helpful in future decisions on the management of the lake and the protection of the lake; and its environment.

Even though Lake Hawassa is probably the most studied lake in Ethiopia in many respects and disciplines until now no researcher have tried to estimate the recreational value of the lake using the Travel Cost Method (TCM) and to drive a recreational demand function to the lake's outdoor recreation.

Hence this research study have estimated the outdoor recreational value of lake Hawassa using the TCM and derived the demand equation thereby calculate the consumer surplus of visitors.

1.4. Objectives of the Study

This research study is conducted with the main objective of estimating the recreational value of Lake Hawassa, with the following specific objectives.

- Identifying the determinants of outdoor recreational demand of the lake,
- Estimating the recreational benefit and consumer surplus (CS) of visitors, and
- Drawing conclusions and forwarding policy recommendations upon the results found.

1.5. Significance of the Study

This research study is significant in the following ways. First, it will add value to the literature wealth in the area. Ethiopia, though, endowed with various natural recourses that are suitable for outdoor recreation still very little is done and the country is not as such benefiting economically from these sources of tourism and income. This is to some extent because of the fact that there have been limited studies made on these resources and good investments that took into consideration these studies. Thus, this research thesis will add some value that serves as a base for further studies and a reference material for other researchers. Second, based on the results and policy implications forwarded the government, the society, investors and other concerned bodies will have a better and studied ground for future decisions concerning the lake's recreational potential.

1.6. Scope and Limitation of the Study

The scope of this study is delimited to studying the outdoor recreational value of Lake Hawassa. And only onsite visitors of the lake were taken as samples to conduct the study.

While doing this thesis the researcher has faced various problems like time and financial constraint, and some difficulty in getting cooperation from respondents for interview. In addition this study employs the Travel Cost Method of Environmental Valuation specifically the Individual Travel Cost Method which is subject to its own short comings as a method.

1.7. Organization of the Paper

This research paper is organized into five chapters. The first chapter is the introductory part where background of the study, statement of the problem, objectives, significance, scope and limitation of the study and description of the study area are presented. The second chapter is the literature review part and both theoretical and empirical literatures are reviewed in it. The third chapter covers the methodology of this study while in the fourth chapter descriptive analysis of the socio – economic characteristics of respondents and econometric analysis results are presented. Finally the last chapter is about the conclusions of the analysis and policy recommendations forwarded upon the results.

CHAPTER TWO

LITERATURE REVIEW

2.1. Theoretical Literature Review

2.1.1. Types and definitions of natural resource

The resources of land, forests, savannahs and seas fall into several categories. However the two main types of natural resource can be distinguished as:

i. Renewable natural resources

ii. Non-renewable natural resources

Non-renewable natural resources are those of fixed supply such as oil, coal, gold or iron – that is, their continued use will inevitably result in exhaustion. Renewable natural resources are those that have the capacity to regenerate them, and are therefore potentially inexhaustible when used appropriately, e.g. fish, forests, solar energy, water, and the atmosphere. (Abila, et. al.,)

The world consists of ‘goods’ (physical components) and ‘services’ (non-physical components). Both non-renewable and renewable natural resources are ‘goods’ i.e. they are tangible and exist as physical ‘stock’ within a limited area. As such, they can be privately, communally, or governmentally owned and/or managed. And, since they are tangible in nature, they are also generally recognized to have market value, although the market values do not always reflect their true value to society. (Abila, et. al.,)

Environmental resources, on the other hand, are those that are of benefit to humankind but are difficult, if not impossible, to own: and referred as ‘public goods’.

Many of these are based on a functioning ecosystem. Examples include clean air, flowing rivers, the existence of particularly plants and scenic beauty. (Abila, et. al.,)

2.1.2 The Need for Environmental Valuation

'Environmental valuation' is a very active and rapidly expanding field. The original, and still the principal, motivation for environmental valuation was to enable environmental impacts to be included in cost–benefit analysis while the impacts can be favorable or unfavorable. However, in the past few years there have emerged two further sources of demand for environmental valuations. The first is the perceived need to take account of environmental damage in measuring economic performance. And secondly economists' valuations of environmental damage are now admissible evidence in fixing the compensation to be paid by those who are responsible for the damage. (Perman, 2003)

For McConnell and Haab (2002), the notion of efficient allocation of natural resources is a powerful idea that leads economists to devise and refined methods for measuring whether and to what extent resources have been allocated effectively. Hence measurement is an essential part of the environmental valuation because it allows the idea of efficiency to be applied to an array of resources, and the basis for decisions that can improve resource allocation.

Markets cannot efficiently allocate natural resources as public goods or resources with pervasive externalities which suggests the possibility of improvement by public action. But whether the public action in fact yields net benefits requires measurement. To meet the demands of measurement of natural resources economists have devised a variety of empirical tools. These tools are typically called environmental valuation methods. (McConnell and Haab, 2002)

2.1.3. Dimensions of Value of Natural Resources

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

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

Indirect use value: of environmental resources could be recognized from their biological mechanisms or ecosystem impacts. Environmental service flows have impacts on economic productivity of ecological systems (e.g., agricultural productivity, forestry, commercial fisheries, etc.) and they may have other ecosystem impacts (e.g., recreational uses of ecosystems - fishing, hunting, etc. and ecological diversity, stability, etc). These ecosystem impacts of environmental resources have some indirect use values.

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

Quasi-option value: is related to future benefits of environmental resources that would result from future use due to future discoveries on new use of the resource but do not belong to current development activities. People attach some value to future use of environmental resources, which would be made impossible by today's development

decision. Thus, quasi - option values refer to future benefits of environmental resources derived from their future use under new future discoveries on new use of the resource that are intact by current development decision.

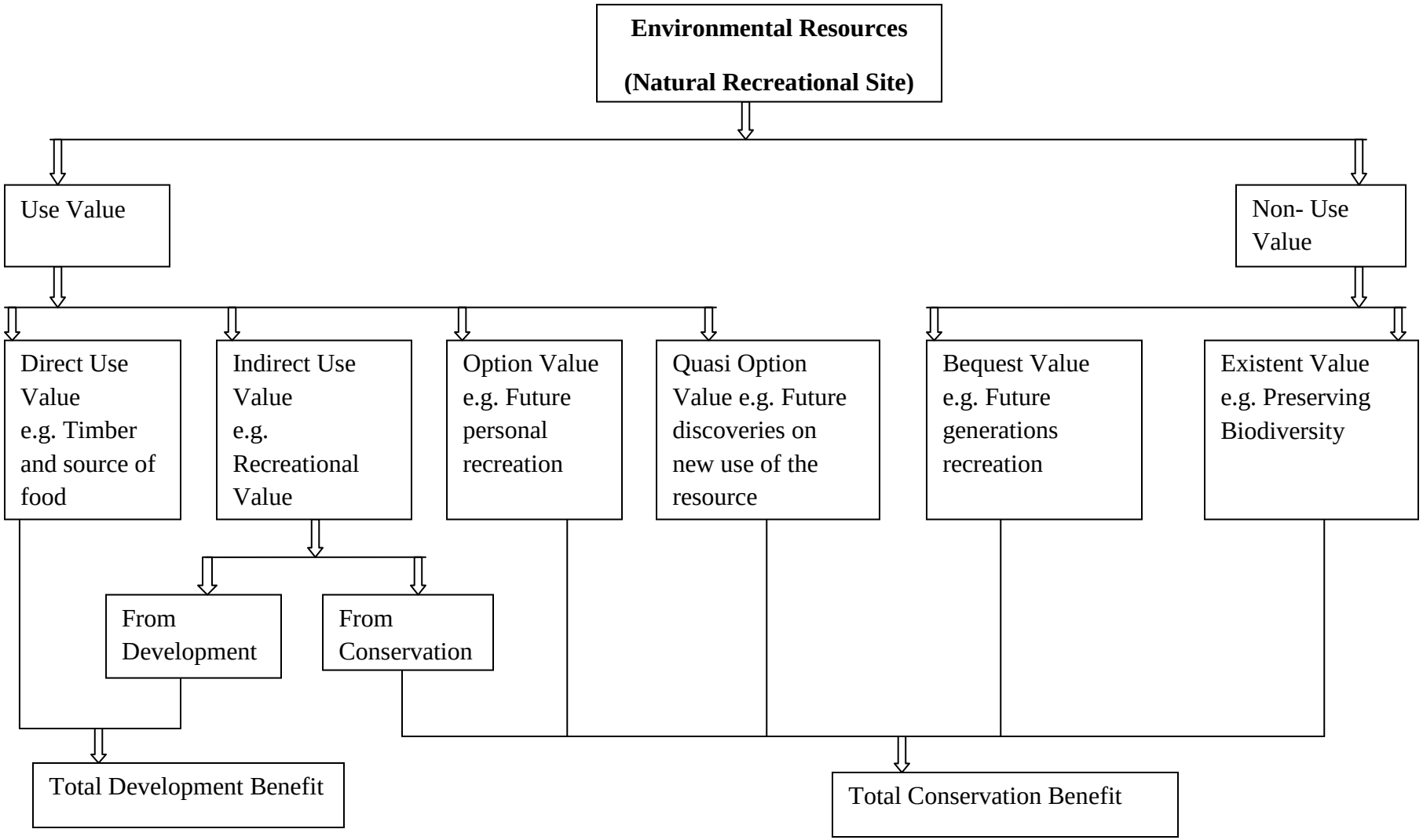
Bequest values: are placed by individuals on environmental resources, which might be passed on to future generations. They capture the willingness to pay (WTP) in terms of people's desire to bequeath certain environmental goods and services to one's heirs or future generation. These values are said to arise from a sense of stewardship or responsibility for preserving certain features of natural resources and a desire to preserve options for future use by others. Thus, knowing that future generations will have the opportunity to enjoy environmental goods and services people attach these values to the resources.

Existence values: are values placed on environmental goods and services, which are not related to consumption of the goods and services. Even if a person knows that they will never get to visit a place, they derive some value from the knowledge that it exists.

Thus, knowing that environmental goods and services have been preserved in perpetuity, even if no recreational use is contemplated, people attach these values to the resources. (Sitotaw, 2003)

The total value of a natural resource then is the sum of all the use values and the non – use values. In this study, however, an attempt is made to value the recreational use value of Lake Hawassa. The following figure shows the various components of value of a natural resource.

Figure 2.1 Total Economic Values of an Environmental Resource



Source: Bateman, 1993

2.1.4. Environmental Valuation Techniques

In economics, there are two basic approaches for benefit estimation of natural resources. These are the Indirect or Behavioral methods (or revealed preference methods) and the Direct or Stated preference methods. With behavioral methods, the researcher observes individual behavior in response to changes in public goods, and from this behavior attempts to infer the value of changes in public goods. The Travel Cost and the Hedonic Pricing Methods are the known techniques of environmental valuation from the behavioral methods. In the stated preference approach, researchers pose contingent or hypothetical questions to respondents inducing responses that trade off improvements in public goods and services for money. From the responses, one can infer preferences for or the value of changes in public goods. Stated preference is an omnibus name for a variety of approaches. The most prevalent is contingent valuation and others include contingent ranking, contingent choice and conjoint analysis. (McConnell and Haab, 2002)

2.1.4.1. The Stated Preference Methods (Direct Valuation Methods)

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

I. Contingent Valuation Method (CVM)

The contingent valuation method (CVM) is a direct method in that it involves asking a sample of the relevant population questions about their WTP or WTA. It is sometimes referred to as a stated preference method. It is called ‘contingent valuation’ because the

valuation is contingent on the hypothetical scenario put to respondents. Its main use is to provide inputs to analyses of changes in the level of provision of public goods/bads, and especially of environmental 'commodities' which have the characteristics of non-excludability and non-divisibility. As compared with indirect methods it is seen by many economists as suffering from the problem that it asks hypothetical questions, whereas indirect methods exploit data on observed, actual, behavior. On the other hand, the CVM has two advantages over indirect methods. First, it can deal with both use and non-use values, whereas the indirect methods cover only the former, and involves weak complementarity assumption. Second, in principle, and unlike the indirect methods, CVM answers to WTP or WTA questions that go directly to the theoretically correct monetary measures of utility changes.

II. Choice Experiment Method (CEM)

The pioneer of this method is said to be Lancaster (1966) and the econometric model used for analysis is mainly due to McFaden (1974). The basic idea of this method is individual consumers derive utility/satisfaction from goods through the attributes the goods provide. The CEM is based on the idea that any environmental good can be described in terms of its attributes and the levels it take. Respondents are presented with various alternative descriptions of a good, differentiated by their attributes and levels and are asked to rank the various alternatives to choose their most preferred attribute. (Hanley et al., 2001)

2.1.4.2. Revealed Preference Methods (Indirect Valuation Methods)

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

I. Hedonic Pricing Method (HCM)

The hedonic pricing method (HCM) is an indirect valuation method that is used to estimate economic values for environmental services that directly affect market prices. It is most commonly applied to "*variations in housing prices that reflect the value of local environmental attributes. It can be used to estimate economic benefits or costs associated with environmental quality, including air pollution, water pollution, or noise*." (Letson, 2002)

The hedonic price approach is based on the theory that value of a commodity is a bundle of valuable characteristics, one or more of which may be environmental. The basic premise of the hedonic pricing method is that the price of a marketed good is related to its characteristics, or the services it provides. "It assumes that goods and services are defined by the attributes embodied in them, and the values of these goods and services are the sum of the values of the attributes which they contain." When goods or services contain an environmental characteristic, the market value of the environmental characteristic is 'embedded' in the market price of the good or service which contains the characteristic. (Abila, et al., no date)

The hedonic pricing method uses the prices of traded commodities to determine the value of environmental characteristics that are thought to affect the price of the item. The main disadvantage of this valuation method (HPM) is it cannot be used to estimate non use

values of an environmental resource. In this regard the method has limited importance. (Nega, 2012)

II. The Travel Cost Method (TCM)

As a method used to value non- market resources, the travel cost method is a good deal older than the other methods. It arose in a context of a debate over the use of public lands in western United States. Many of the competing uses for the land – cattle ranching, mining, and logging- had marketable outputs. The need for a method that permitted a comparison of the value of market activities with the value of outdoor recreation led to the development of the travel cost method. The travel cost method was for the first time suggested by Harold Hotelling in 1947, in an unpublished letter, who responded to the Department of Interior officials requesting a means of evaluating the benefits of public lands. Then in one of the earliest applications, Clawson computed visitation rates per 100,000 populations to the major national parks in the US by cost. (McConnell and Haab, 2002)

When the travel cost method is employed for measuring the benefits and costs of public actions, it can be used in two ways. The original use and this remains important, was to determine the best use of public land which might have both commercial potential in the private sector and recreational use in public sector. But recreation takes place outdoors, and can be substantially affected by air and water pollution, recreation models are now commonly used to measure the benefits of pollution control or other changes in the policies that influence the quality of sites.

The travel cost model is a model of the demand for the services of a recreational site. The essence of the travel cost model stems from the need to travel to a site to enjoy its service. A participant who chooses to visit a site must incur the cost of overcoming the distance. All methods that use travel cost relay on the insight that differences in costs cause differences in quantity demanded. Sometimes the differences relate to the different costs to different households visiting the same site and sometimes the cost differences relate to different sites for the same household. (McConnell and Haab, 2002) In this study however, the former cost difference, i.e., the different costs to different households visiting the same site is considered in modeling the recreational demand.

Using the travel cost method, researchers can calculate the economic costs necessary to reach a recreational site as an estimate of user willingness to pay for recreation. That economic cost may include entry fees, monetary costs of travel, and foregone earnings. In effect, these travel expenses represent the "price" of the recreational experience and are an indirect but observable indicator of user value. By comparing the number of visits that individuals make at different levels of travel cost, economists are able to estimate economic value for site attributes, such as improved environmental quality (Letson, 2002)

The basic premise of this method is that the time and travel cost expenses that people incur to visit a site represent the 'price' of access to the site. Thus, 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 (Abila, et. al.,)

Travel cost models have developed considerably since their initial use. They can be used to estimate the welfare effects of the elimination of a recreational site or a change in the quality of the site. (McConnell and Haab, 2002)

Basic Assumptions of the Travel Cost Method

According to McConnell and Haab, 2002, to be confident about welfare calculations, the goal of travel cost models, the circumstances of recreational choice should approximate the conditions assumed in the model. The following conditions ought to hold to allow the calculated surpluses to stand for welfare measures:

1. Travel and time cost is a proxy for the price of a recreational trip. This assumption will be violated if a travel cost item provided utility for its own sake, such as transport cost on a ferry as part of a trip or the chartering of an essentially nice charter boat.
2. Travel time is neutral, providing no utility or disutility. This assumption will be violated when a site is chosen over sites because travelling to the site provides utility. Of course, travelling always provides some utility or disutility, so one needs to be aware of gross violations of the assumption of neutrality. This issue can be handled empirically by careful model specification.
3. The decision unit is trips of equal length at the site for each household. Substantial variation of trip length across site or household calls for a recommendation of the model. For example, one would not mix one day trips and two days trips to the site in the same demand function without further model development. Further when households choose the amount of time on the site- such as how many days to stay at the beach- the model needs reconstruction.

4. The trips are single purpose trips, taken to the recreation site for the purpose of recreation. Multiple purpose trips are difficult to manage, especially when the trips are for multiple days. For example when a family takes a week's vacation, and some visits to a beach several days during the vacation, the travel cost obviously ought to be computed for the local travel only. More difficult issues arise when the trip is a day trip but the individual takes a roundabout route in order to visit several different destinations.
5. The quantity consumed is the basic equation – that is, $\mathbf{X_{ij}}$ – is trips to the same site for all consumers. This assumption rules out pool trips from different sites. For, example a model estimated when the $\mathbf{X_{ij}}$ are trips to a variety of different freshwater recreational sites within a geographical area, such as a state, in effect compounds coefficients from different site demands. It might look like a demand curve empirically. But this model cannot be used to predict demand or calculate welfare measures at any recreation site unless the demand for each site is identical.

In addition to the above assumptions, Freeman (1993), made the following additional assumption:

- It is assumed that the wage rate is the relevant opportunity cost of time.

The method also assumes weak complementarities between the recreational site and consumption expenditure. This implies that when consumption expenditure falls to zero, the extra utility of visitation is also zero, or alternately the recreational site will only be valued if consumption expenditure is positive (Hanley and Spash, 1993).

When these assumptions hold reasonably well, one can make the case for the use of the travel cost model.

A Simple Travel Cost Model of Demand for a Site

A simple travel cost model of demand for a site and its construction has been forwarded by Freeman (1993) as follows.

The travel cost model is based on the recognition that the cost of traveling to a site is one important component of the full cost of a visit and that, for any given site; there will usually be wide variation in the travel cost across any sample of visitors to that site.

The model based on the above assumptions; is assumed that the individual's utility depends on the total time spent at the site, the quality of the site, and the quantity of the numeraire. The individual solves the following utility maximization problem:

$$\text{Max: } U(X, R, Q) \quad \ldots\ldots \quad (2.1)$$

Subject to twin constraints of monetary and time budgets:

$$M + P_w * T_w = X + C^* R \quad \ldots\ldots \quad (2.2)$$

and, $$T = T_W + (T_1 + T_2) R \quad \ldots\ldots \quad (2.3)$$

Where X = the quantity of the numeraire whose price is one,

R = number of visits to a recreational site,

Q = environmental quality at the site,

M = exogenous income,

P_w = wage rate,

C = monetary cost of a trip,

T = total discretionary time,

T_W= hours worked,

T_1 = round trip travel time, and

T_2 = time spent on site.

Assume that R and Q are complements; this means that the number of visits will be an increasing function of the site's environmental quality. The time constraint reflects the fact that both travel to and from the site and time spent on the site take time away from other activities. Thus there is an opportunity cost to the time spent in the recreation activity. Assume also that the individual is free to choose the amount of time spent at work and that work doesn't convey utility (or disutility) directly. Thus the opportunity cost of time is wage rate. And finally we assume that the monetary cost of a trip to the site has two components, the admission fee 'F', which could be zero, and the monetary cost of travel. This cost is $P_D * D$, where P_D is per mile cost of travel and D is the distance to the site and return from it.

Substituting the time constraint (2.3) into the monetary budget constraint (2.2) yields:

$$M + P_W * T = X + P_R * R \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (2.4)$$

Where P_R is the full price of a visit given by

$$P_R = C + P_W (T_1 + T_2)$$

$$P_R = F + P_D * D + P_W (T_1 + T_2) \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (2.5)$$

From equation (2.5) the full price of a visit consists of four components: the admission fee, the monetary cost of travel to and from the site, the time cost of travel to and from the site, and the cost of time spent at the site. On the assumption that individuals are free to choose the number of hours worked at a given wage rate, the two time costs are valued at the wage rate.

Maximizing equation (2.1) subject to the constraint equation of (2.4) will yield the individual's demand function for visits:

$$R = R (P_R, M, Q).$$

Then the recreational value of the site is the total area under this derived demand curve.

Zonal Versus Individual Travel Cost Methods (ZTCM Vs ITCM)

In using the travel cost method for environmental valuation one has two options as approaches within the method. These are the Zonal Travel Cost Method (ZTCM) and the Individual Travel Cost Method (ITCM).

The zonal travel cost method is the simplest and least expensive approach. It will estimate a value for recreational services of the site as a whole. It cannot easily be used to value a change in quality of recreation for a site, and may not consider some of the factors that may be important determinants of value. The zonal travel cost method is applied by collecting information on the number of visits to the site from different distances. Because the travel and time costs will increase with distance, this information allows the researcher to calculate the number of visits "purchased" at different "prices."

This information is used to construct the demand function for the site, and estimate the consumer surplus, or economic benefits, for the recreational services of the site.

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 will give more precise results. Rather than simply collecting information on number of visitors and their distances, the researcher would conduct a survey of visitors. Using the

survey data, the researcher can precede in a similar way to the zonal model, by estimating, using regression analysis, the relationship between number of visits and travel costs and other relevant variables. This time, the researcher would use individual data, rather than data for each zone. The regression equation gives us the demand function for the "average" visitor to the site, and the area below this demand curve gives the average consumer surplus.

In this study the individual travel cost method is used because of 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, cited on Andualem, 2011)

The Concept of Consumer surplus (CS)

The idea of consumer surplus (CS) is a central tenet of the travel cost method. The importance of CS in the TCM lies in the fact that it actually represents how much a visitor values a trip or visit to a recreational site. So invariably, the CS represents the recreational use value attached to a recreational site. Sohngen *et al*. (1999) state that the consumer's surplus is the additive value above travel cost that individuals get by visiting a recreation site each season (year). In ordinary economics terms, the consumer surplus is

the difference between the actual price you pay for some good and the maximum price you would have been willing to pay for it other than do without it (Ndichia, 2007). Alfred Marshall elucidates more on this by saying that "*The price which a person has to pay for a thing can never and seldom comes up to that which he would be willing to pay rather than go without it, so that the satisfaction he gets from its purchase generally exceeds that which he gives up in paying away its price; and he thus derives from the purchase a surplus satisfaction. The excess of price which he would be willing to pay rather than go without the thing, over that which he actually does pay, is the economic measure of this surplus satisfaction. It may be called consumer's surplus"* (Ndichia, 2007). In the light of this foregoing definition by Ndichia and the succinct explanation by Marshall, and in the context of the TCM, it can then be stated intuitively that the CS is the difference between the total travel costs or expenses incurred by a visitor to a recreational site and the maximum amount he or she was (or would be) willing to spend in order to make the visit or trip. (Timah, 2011)

Difficulties with the Travel Cost Method

1. Complexity and difficulty

ITCM necessitates a more labor-intensive data collection process because it necessarily requires the collection of all data from each site visitor. This makes ITCM relatively more complex and difficult. The collection of all relevant data from each visitor of different origins is expensive and time taking to conduct the survey. Hence, much of the literature on the subject presumes the adoption of ZTCM i.e. recreationists are classified

according to their zones of origin and their visits are usually expressed as visits per capita (visits/population).

2. Specific characteristics of the site:

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

3. Multi-purpose trips:

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

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

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

In the case of meanderers, there are two options to include their travel cost to the specific site, to ask people to score a relative importance of a visit to the site under consideration, or relative to their enjoyment of the entire trip. This score, expressed as a number between 0 and 1, can be used to weight their total travel cost (Hanley and Ruffel, 1992in Beteman et. al., 1993).

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

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

1. To ask people to score a relative importance of the site under consideration; or to exclude holiday-makers; or
2. To treat holidaymakers no differently from day-trippers and consider only their daily travel costs. However, these cannot be a guarantee for the total value to be free from bias

4. The Travel Cost of nearby residents

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

These are some of the difficulties of the TCM as compiled by Sitotaw (2003). Measurement of time is also an important area of controversy among economists and it is explained in the methodology part of this study

Advantages of TCM

Despite all the difficulties in mentioned above in using the TCM, it has several advantages. These are:

- TCM is based on observed behavior. The travel data that are generally obtained by a visitor survey are used to derive the demand curve for the site under consideration.
- TCM can be applied effectively and relatively inexpensively to a site when situations at alternative sites are expected to stay constant.
- TCM is a well-tried technique that produces plausible results. (Sitotaw, 2003)

2.2. Empirical Literature Review

2.2.1. Study on Recreational Benefit Using TCM and CVM

Herath (1994-1995) had estimated the recreational value of community lake- Lake Macova in Victoria using travel cost and contingent valuation methods. According to the study the water quality of the lake has deteriorated due to a major algae bloom in 1990 - 1991. The lake also suffered from a major drought in 1982-83 and did not refill to its capacity until 1987. This resulted in loss of aquatic biodiversity and further degradation. Lake Macova has been the center of a number of water quality investigations but the absence of studies of the recreational and other values of the lake has constrained

important decisions in planning. Therefore, the study aimed at estimating the recreational value of the lake using the travel cost and the contingent valuation techniques. A total of 130 samples were used to do both the zonal and individual travel cost analysis and 60 for the contingent valuation analysis. The consumer surplus from the zonal travel cost method was $ 31, 300 per year while from the individual travel cost method a consumer surplus of $21,900 was estimated. In an open ended method all respondents were asked the following question. “If the government can no longer fund the maintenance of the lake particularly due to the recurrent episodes of the algae blooms which has increased costs of maintenance and reduced recreational capacity of the lake what will be the maximum amount that you will be willing to contribute to upgrade the lake?” The result of the regression shows that the maximum, minimum and average WTP were $20, $0 and $ 4.90 respectively. The total consumer surplus was determined using the mean WTP of $ 4.90 and the average number of visits. The total WTP computed was $ 61,100 which was nearly double of the one computed by the TCMs. According to the conclusion of the study since the travel cost method only measures the use value of the lake the result from the contingent valuation was more appropriate.

2.2.2. Studies on Recreational Benefit Using TCM and CE

Mesfin (2010) has conducted a study of estimating the economic value of the Wendo Genet recreational wetland ecosystem, which is one of the most well- known nature based recreational sites in Ethiopia. Even though, the Wendo Genet ecosystem has many sources of attraction, the site has been unable to improve the qualities of the recreational experience, expand the types and varieties of its recreational services and generate a good deal of revenue.

Therefore, to attach quantitative estimates to the onsite recreational benefits of the site so that the respective authorities could take measures of improvement, he had employed the travel cost method from the revealed preference methods and the choice experiment technique among the stated preference methods of environmental valuation. In doing so he had used primary data that was collected from 192 onsite visitors of the Wendo Genet recreational site.

The travel cost method of valuation depends on information about the amount of money and time visitors spend getting to the site to infer a value for the site. Since only current users of the site were taken as samples, the demand was estimated using Maximum Likelihood estimates of the truncated model. The regression results of the travel cost method shows that travel costs, income, education and cost of accessing a substitute site and acquaintance with the site are important determinants while age, family size, gender, mode of transportation, and employment condition were insignificant determinants of recreational demand of the site. The recreational benefit computed found to be Birr 424 per person and an aggregate annual benefit of Birr 7,899,301 was expected.

The choice experiment method on the other hand, was employed to measure visitor's valuation of the site's quality improvement and to examine the general attitudes towards the recreational site's resource. He employed the attributes -forest, recreational quality and general service as recreational site's quality indicator and an additional monetary attribute- gate fee.

Multinomial and random parameter logit models were used for estimation. All the attributes were significant factors in affecting the probability of choosing an alternative scenario. But visitors were given high value for recreational quality attribute (such as the

construction of additional swimming pool and toilet facilities) than forest and general services attribute. This was implied by their marginal willingness to pay for different attributes which was found to be Birr 7, Birr 2.93, and Birr 0.985 per visit for recreational quality, general services and plantation of degraded areas respectively. Moreover, compensating surplus estimates which reflect overall willingness to pay for a change from the status quo to alternative improvement scenarios were calculated and obtained as Birr 44, Birr 37 and Birr 22 per visit for high impact scenario, medium impact scenario and low impact scenario respectively.

Ali (2011) also conducted his masters thesis on valuing the economic benefit of ecotourism of the Semein Mountain National Park using the travel cost and choice experiment environmental valuation techniques. The Semien mountain national park is a home of many endemic animals and is known for its impressive landscape. Although it was inscribed in the list of World Heritage sites by UNESCO in 1978 since 1996 it has been in the list of world Heritage in danger due to heavy settlement by farmers, declining numbers of Walia ibex, widespread deforestation and continuous reduction in recreational qualities of the site. Furthermore, the site has been unable to improve the qualities of ecotourism experience, expand the types and variety of its recreational services and moreover, the value of the park in terms of its recreational service to the society is not known. Thus, there was a need for valuation of the park to know how much value the people attach to the park so as to demonstrate how the site managers can extract revenue out of the excess benefit. A sample of 200 on-site visitors was interviewed face to face to collect data for the study of which 140 were foreign visitors and 60 were domestic visitors.

The travel cost method of valuation was from information about the amount of money and time visitors spend to reach that site. Here, actual cost which is the sum of travel cost per

round trip and on-site staying cost, and the maximum willingness to pay (MWTP) are the two most important variables that we used to determine consumer surplus. Accordingly, the average consumer surplus per person was estimated to be Birr 3147 and 390.4 for foreign and local respondents respectively. This translates in to an expected aggregate annual recreational economic benefit of Birr 48,562,086.4 (approximately US$ 2,943,156.7) which reflects the value of the benefit that visitors gained by visiting the park. The total recreational economic value equals the total consumer surplus plus the total price paid. The annual monetary recreational economic value of the SMNP is about Birr 136,763,485.1. Even if the Park had a much larger economic potential than was actually realized, records show that the park was getting only 14 percent of the potential recreational economic benefit of the site for the survey 12 months.

The choice experiment method (CE) was employed to measure visitor‘s valuation of different attributes of the site, and to examine their general perception towards the park‘s services and resources. Three attributes that can explain the park‘s quality (namely, the number of Walia ibex and Ethiopian wolf population, afforestation and additional service to visitors) and entrance fee as a monetary attribute were included in choice experiment. Multinomial and random parameter logit models were used for estimation and from this the marginal willingness to pay and welfare impact of the visitors was estimated. All attributes were found to be important determinants in the choice of the park‘s resource management. The positive signs of the coefficients mean an improvement of these attributes can increase the utility of the respondents. The monetary attribute ―entrance fee had the expected negative sign, which is in agreement with the hypothesis that cheaper plans are preferred to more expensive plans after other characteristics are held constant. On the other side, age, family size, and income are positive but insignificant.

But years of education was positive and significant implying that as years of education increases, the probability of choosing the improved scenario options increases, ceteris paribus. Moreover the coefficient of interaction of ASC with gender is negative implying that the probability of choosing the improved option is higher for female as compared with male, other things being constant. The positive coefficient of family size was not expected to be negative but it is insignificant. The implicit prices suggest that foreign respondents were willing to pay about 42.5 birr per day for an increase in the level of Walia ibex and Ethiopian Wolf animals, other thing being constant, 0.00002678 per day for afforestation and 15.9 Birr per day for an increase in the level of improved additional services. While estimates of the implicit prices (MWTP) for each of the non-monetary attributes of the local visitors show that local visitors are willing to pay an additional fee of about Birr 12.05 per day for an increase in the level of Walia ibex and Ethiopian wolf population attribute, about 0.0000062 Birr per day for each new tree plantation and 2.76 Birr for an increase in the level of improved additional services attribute from the status quo level.

2.2.3. Studies on Recreational Benefit Using TCM

Mahmud (1998) conducted a research to estimate the economic valuation of Sodere natural recreation area and demonstrated that the total amount that the site authorities are collecting through gate fees from visitors per year does not reflect the true, social recreational benefit of the site. In his study, 232 sample visitors were used as his samples that represent visitors in different recreational activities such as Main Swimming Pool, Little Swimming Pool, Common Bath and Abader Bath in the site. Then, random selection was adapted to interview individual visitors at each stratum. The interviews included both objective questions and visitors' opinion. In the TCM, a linear demand

curve was estimated. In this study, visitors' total enjoyment into travel and on site experience was allocated by asking them how much value they attach to their travel and on-site experience. Then, taking the mean value for the on-site experience to be 68.5%, (as calculated from the sample), per person annual recreational benefit for the on-site experience was estimated as Birr 759.07x68.5%=Birr 520. Considering the annual visits of 171,336 as obtained from the data and taking the mean value for per person annual visits of 9.069 in the sample, he estimated the expected total on site recreational benefit of Birr 9,824,094.80 per annum. But, the site management collected from Birr 50,000 to 100,000 from gate fees each month to finance its expenses and salaries for employees of the site which is very low.

Terefe (2000) examined the economic value of Tis-Abay Water Falls using TCM. In his effort to measure the value of outdoor recreation for this site, 140 visitors were used as his sample groups by residence on the basis of distance from the site. In the interview, socio-economic demographic and attitudinal information were gathered from the respondents. Then, using this information on the percentage of sampled visitors from each of the zones, total visitors per year and the population in each zone, the visit rate per 1000 population in each zone was determined. In his model, he took income, taste, availability of substitute sites, quality and population in addition to travel cost to explain visitation rate /1000 population at zero admission fee. Then, TCM was estimated using semi-log independent functional form after dropping insignificant variables.

The study indicated that the optimal gate fee is Birr 40 and the maximum expected revenue for the site is Birr 85,812,000 (=40x21378) where 21378 is the number of total

visits per year. The economic value of the site was estimated at Birr 2,181,998,095 per year based on the demand curve.

Sitotaw (2003) had used the travel cost method to value the outdoor recreational benefit of the Wabi Shebele Langano recreational site. Economic values of recreation sites, national parks and other natural resources in Ethiopia are not properly examined with appropriate and well-defined scientific approaches which led to lack of proper management of resources that in turn deteriorates of the quality of these resources. Poor resource management occurs, among other things, due to absence of estimated value of resources. If there is no proxy of economic value of natural resources, it is apparently difficult to generate sustainable revenue from internal sources to support the endeavor to be made towards the improvement and expansion of quality of such resources. The Wabi Shebele Langano recreational site was no different and proper valuation of its benefits is necessary.

Since the data for the dependent variable (visits per year) are count data (integer), and statistical tests assured that the data has no over dispersion problem the truncated Poisson model was used in the empirical analysis. A sample size of 280 Wabi Shebele Langano recreational site visitors was interviewed on the site to collect data.

The regression results obtained from this study showed that travel costs, visitor's income, acquaintance with the site, family size, age, level of education, being a head of the family, availability of Bekele Mola and Abule Basuma recreation sites were important determinants of the recreation demand of the site. The coefficient of travel cost is negative and significant implying that an increase in travel cost reduces the number of visits of the site, as would be expected. Similarly, the coefficient of income variable is

positive and significant implying that the demand for recreation increases as visitor's income increases. The results also suggest that visitors' on-site time increased as the number of visits increased. This is an indication that the greater the time available to spend on recreation site the greater the demand for the recreation site. The relationship between education variable and recreation demand was negative and significant implying that the less educated people make more frequent visit than more educated ones.

Furthermore the recreational benefit computed from the regression analysis indicated that the on-site recreational benefits per visit amounted to Birr 751.95 and the expected total annual benefit of the site was, therefore, estimated at Birr 8,685,774. Using the exponential demand function, consumer surplus (CS) for the average number of visits is calculated as the area below the demand curve and above the average travel cost of Birr 510. Thus, individual consumer surplus (CS) per visit was approximated to Birr 440.52 while the aggregate consumer surplus was approximated to Birr 5,082,440.

Timah (2011) had done a thesis focused on using the travel cost method (as a non-market valuation technique) to value beach recreation in a developing country (Cameroon) where little or no previous works of this kind have been conducted before. The Ngoe beach was used as a case study based on the fact that a reasonable number of visitors and tourists visit the beach and also because Kribi is a popular resort town in Cameroon. Given the nature of the work, an onsite survey was inevitable and 242 onsite visitors were chosen as samples.

The count data that was generated from the survey was modeled with the left truncated Poisson and negative binomial models as well as the zero-inflated negative binomial model. The econometric estimations (carried out with the use of the TSP 5.0 software)

showed that the zero-inflated negative binomial model produced better results and based on these econometric results, consumer surplus (CS) estimates per trip per visitor per day were computed for different categories of visitors. These CS estimates are equivalent to the recreational value of the beach per trip per visitor per day and ranged from €2.56 to €41.51. Although different CS estimates were obtained for the different categories of visitors, CS estimates per trip per visitor per day ranging from €9.86 to €37.11 were considered as more appropriate and consistent with the results of other works. Also, a possible access fee to the beach of €2.0 was suggested based on the stated willingness to pay of visitors. The reason for this suggestion is that the Ngoe beach is an open access beach and it was thus interesting to estimate a likely access fee, should someone (probably the municipal authorities) be thinking of implementing an access fee. Another important finding is that tourists had the highest spending propensity than any other category of visitors. Also, visitor's income was found to have a very small impact on the CS estimates of visitors whereas the stated willingness to pay of visitors was found to largely correlate with their CS estimates.

Christopher and Averil (2007) made an estimation of the recreational value of Lake McKenzie using the travel cost method. Lake McKenzie is one of the most highly used and popular visitor destinations of all Fraser Island's natural sites, in Australia, attracting 2,000 visitors a day in peak periods. Many consider this level of visitation to be unsustainable and the management authority is considering a range of management options. In assessing the alternatives it is useful to have some idea of the recreational value of the Lake under the current regime. Although the objective of the study was to estimate a recreational value of Lake McKenzie, doing so using the travel cost method

was problematic because almost all visitors to the Lake also visit other attractions on Fraser Island. In fact Fraser Island itself was viewed as an attraction and most of the travel costs are spent in reaching the Island. The decision was made therefore, to estimate the recreational value of Fraser Island in its entirety and then apportion some of this value to Lake McKenzie.

From the travel cost method the researchers selected to use the zonal travel cost method which was suitable for their study. A mail survey has been done to collect data and 430 sample responses have been used in the study.

Using the log-log functional form for the trip generating function, an adjusted aggregate consumer surplus of $191,353,287 and per-person per-visit consumer surplus $1,461.73 was estimated for the Fraser Island. Using two methods i.e., the reported satisfaction level from Lake McKenzie and time spent on the lake a proportion of consumer surplus from the Island was calculated. Hence, using the satisfaction measure, an aggregate consumer surplus for Lake McKenzie of $75,713,369, or an average of $578.37 per-person was estimated. It was then adjusted for multiple-site visitors and yields a consumer surplus for Lake McKenzie of $31,789,212 or an average of $242.84 per-person. On the other hand the time measure estimation results in an aggregate consumer surplus of $33,582,451 or an average of $256.53 per adult. Using the consumer surplus estimates adjusted for multiple-site visitors, yields a consumer surplus estimate for Lake McKenzie of $13,653,883 or $104.30 per person.

Blackwell (1999/2000) also estimated the value of a recreational beach visit of the Mooloolaba beach in Australia using the travel cost method. Beaches and foreshores worldwide offer a broad range of goods and services to coastal communities and

economies. One service, beach recreation, provides considerable benefits to most Australians. Given the recent sea-change phenomenon and the increasing urbanization of coastal Australia, outdoor recreation resources such as beaches are likely to succumb to considerable health pressures and trade-offs in the allocation of scarce funding at the local government level. The contextual comparison of beach recreation values may highlight the potential oversight that beaches in Australia currently receive. Such estimates may be useful to coastal managers, councilors and other interested parties who deliberate over the allocation of resources to maintain or improve the services and biophysical infrastructure of beaches and coastal foreshores.

Thus the paper represented the first Australian attempt to value a recreational visit to surf beaches within the local urban setting of Mooloolaba beach, Sunshine Coast, Queensland using the individual travel cost method via a truncated negative binomial regression model.

On-site interviews of beach users were undertaken across a number of Australian beaches and the results were from samples of 250 groups of Australian beach users. The result this study provides an estimate of consumer surplus per person for a recreation day visit to the beach of $119.95 for the entire sample. The visitor equivalent is $107.75 while the resident's is $17.41.

Carr and Mendelsohn (2003) in their study of estimating the recreational value of the Great Barrier Reef the reason was this. Throughout the world, there are many threats to existing coral reefs. Global warming, mining, overfishing, and water pollution all threaten the viability and health of coral reefs. Although these threats are well documented, programs to protect coral reefs are spotty and underfunded. Advocates for

coral reef protection argue that there are many benefits to maintaining coral reefs, such as recreation, fish habitat, and beach protection. It is only recently, however, that economic studies have begun to discuss how to measure the direct and indirect benefits from coral reefs. Studies have examined the benefits of reef resources, recreation, marine parks, and protected areas. However, quantification of the value of coral reefs is rare and badly needed. This paper applies a well known economic valuation method, the travel cost model, to measure the value of the Great Barrier Reef, Australia which is visited by about two million visitors each year. They have used the travel cost method for valuing the outdoor recreational value of the site.

The study finds that the recreational value of the reef ranges from USD 700 million to 1.6 billion per year. Given the estimated 2 million visitors, this suggests an average value of between USD 350 and 800 per visit.

2.2.2. A Related Study on Lake Hawassa

Girma (2006) had conducted a research study on valuing the benefits of improved lake quality using the choice experiment, method of valuation, on Lake Hawassa. From the study, at Lake Hawassa the high market demand for Tilapia (one type of fish species) in the fast growing urban population and free access to the lake has encouraged the fishing effort to increase far beyond proportion of the fish stock, which has apparently resulted in species depletion. The estimated fish landing from the lake exceeds the maximum sustainable yield. Catchments degradation, municipal and industrial waste as well as uncontrolled fishing practices are among the major causes for resource degradation and ecosystem disturbances of the lake environment according to the Institute of Biodiversity

Conservation (IBC). Hence the IBC prepared the site action plan for development, conservation and sustainable use of the biodiversity resources of the lake and its surroundings. So far no attempt was made how individuals value the multiple services that this ecosystem provides. Particularly, such comprehensive investment plan for the improvement of the ecosystem should integrate people's preferences: the willingness to pay for the improvements to take place for sustainable and wise use of the resource, and identifying attributes of the lake environment which are greatest contributor to community's welfare.

In the paper, the researcher identified, among other things three attributes, i.e., two environmental attributes (Tilapia fish stock, and Surrounding forest cover) and one monetary attribute (fishing permit), and carried out a Choice experiment from a survey of 200 randomly selected fishermen of Hawassa Lake to estimate the value of improvement of the lake quality in general in terms of the attributes selected. The analysis was held using the Multinomial logit model and the results confirmed that fishermen of Hawassa Lake have high levels of environmental concern and are willing to pay for the improvement of the lake environment in terms of the attributes selected in the Choice experiment.

According to the results the most preferred attribute is Tilapia stock and it was reflected by the fishermen's higher willingness to pay for Tilapia fish stock improvement which was estimated to be 8.33 birr per month. Very low willingness to pay was observed for improvement in the degraded surrounding vegetation and forest cover of the lake with almost insignificant mean willingness to pay. Compensating surplus estimates which reflect overall willingness to pay for a change from the status quo (current situation) to

alternative improvement scenarios were also calculated. The estimate for the high impact scenario (Tilapia fish stock will be at high level and one million trees to be planted in the surrounding) was estimated to be 31.42 birr, for medium impact scenario (Tilapia fish stock will be at high level and half a million trees planted surrounding the lake) 28.62 birr and for low impact scenario (Tilapia fish stock will be at medium level and three hundred thousand trees to be planted surrounding the lake) it was 18.62 birr per month.

The important implication drawn from the study was that since the fishermen were willing to support the plan for the environmental improvement, the introduction of fishing permit is promising feature for resource users and as well as to the management of the natural resources as the whole.

CHAPTER THREE

METHODOLOGY OF THE STUDY

3.1. Data Source and Type

For estimating the outdoor recreational value of Lake Hawassa, deriving the demand equation for visitation and calculating the consumer surplus of visitors' primary data was used in this study. This primary data was collected from primary sources that were on site visitors of the Lake.

3.2. Survey Design

3.2.1. Data Set

The data for conducting this thesis was collected using a structured questionnaire which has three parts.

The first part of the questionnaire was designed to get the socio-economic characteristics of sample visitors. These questions ask the age, gender, marital status, level of education interpreted in terms of years of schooling, type of employment, monthly income, family size, and nationality of respondents. In the second part of the questionnaire the questions were designed in a way of getting information about visitors travel cost. Questions in this part include from which city visit to Lake Hawassa was taken, the mode of transportation used to travel to the site, the cost of transportation, the number of hours the transportation took, time spent on the site, and similar others that are helpful to calculate travel cost of visitors. In the last part of the questionnaire, visitors were asked about their general

perception of the site i.e., how visitors rate the site by answering “better”, “as” and “worse” than expected. In addition in this part of the questionnaire, they were asked to state any problems that they have observed or encountered on the site and their own remedial suggestions.

3.2.2. Method of Data Collection

To gather data from sample visitors on site survey was used. Visitors were interviewed face to face using the designed questionnaire. Even though Shaw (1988) states that estimate of demand functions derived by using onsite samples have a possible bias as individuals who are sampled are likely to be those who visit the site frequently, in this study on site survey was preferred from the fact that non visitors to the lake are more likely to have no idea of the site.

A face to face interview was used to collect the data from sample visitors by using the questionnaire. In this study it was very difficult and even impossible to use other survey techniques like surveying through telephone, mail or even e-mail. This was because Ethiopia is a developing country where citizens still don’t have the proper and adequate access for such services of telephone, post and internet. In addition the tendency of the information that is gathered in this way to be biased is high. It was also preferred not to pass the questionnaire to the respondent so they will fill it by themselves because the researcher believes it will lead to answers that are biased and incomplete due to misunderstanding of the questions that need some explanation from the enumerator and due to carelessness of respondents. Due to these reasons the researcher chooses an onsite face to face interviewing method of data collection.

3.2.3. Sample Design

In every study having a representative number and type of sample is a very important step towards achieving the objectives of the study. Therefore, care has been taken to get the representative sample of visitors of Lake Hawassa Recreational site. But at the same time given constraints of time, finance and cooperation from respondents for interview 155 sample visitors were interviewed on the site and were used for analysis of the study.

This study has used a simple random sampling technique for selecting samples. It was executed as follows. On the way from one edge of the lake where people are recreating to the other edge every even number visitor that sits along the side of the lake was chosen as a sample.

Visitors of the lake came from various parts of the country. Addis Ababa, Hawassa, Shashemene, Ziway, Yirgalem, Dila, Debre Zeit, Wendogenet and Hossina are some of the origins of sample visitors. Visitation of the site during the weekends was higher than visitation during weekdays. Due to this more samples were interviewed during weekends than week days. The survey was conducted for three consecutive weeks starting from April 13 to May 3, 2013 of which three were weekends while the remaining were working days.

3.2.4. Field Strategy

A planned and well organized field work is also the other crucial element in gathering a representative sample and achieving the aim of the study. Because of this the researcher has done field observation on both the weekends and week days a week before the actual survey had started.

The survey was conducted by the researcher herself and one more enumerator, who has been trained to collect the data and with good background knowledge in economics, for three consecutive weeks. More samples were taken during weekends than week days since weekend visitors were higher in number than weekday visitors and catching visitors from various origins of the country especially from Addis Ababa and far cities was possible. However, it was evident that visitors from neighboring towns of Hawassa were recreating on working days.

The average time it took to conduct an interview was 22 minutes with the minimum being 15 minutes and the maximum 34 minutes.

3.3. Variables and Expected Signs

The travel cost method is used to estimate the recreational value of environmental goods and services that are used for recreation. It assumes number of visits to a recreational site ($\mathbf{V_i}$) as a dependent variable and travel cost ($\mathbf{TC}_i$) and other socio economic variables as independent (explanatory) variables ($\mathbf{X}_i$).

i.e., $V_i = f(TC_i, X_i)$ Where i represents individual i.

3.3.1. Travel Cost (TC)

The travel cost in this study consists of two costs.

1. **Distance Cost**: it is the round trip cost that visitors have incurred for transportation to and from Lake Hawassa.
2. **Time Cost**: it is the opportunity cost of time of visitors during traveling to and from Lake Hawassa and on their stay at the site.

The sum of these two costs gives us the travel cost of visitors.

In the travel cost method, travel cost is treated as the price visitors pay for visiting a particular recreational site. Like a Law of Demand which states as price of goods and services increases the quantity demanded will decrease, here also as the travel cost (the approximate price to visit a recreational site) increases the number of visits will decrease. Therefore, a negative relationship between travel cost and number of visits to Lake Hawassa is expected. Here measurement of the travel cost should be given good care to get a better approximate. The next section provides a brief explanation about measurement issues.

3.3.1.1. Measurement of Travel Cost

1. **Measurement of Distance Cost:** in measuring the distance cost, which is the round trip transportation cost to and from Lake Hawassa the following ways could be used.

i. Visitors could be asked directly how much they have paid for transportation if they use public transport or how much they have paid for fuel if they are using their own vehicle. Or,

ii. The researcher could take the tariff for public transportation for sample visitors who have used public transport or considering the total distance travelled and the per distance fuel consumption of the particular vehicle, and then calculate the fuel expense of sample visitors who have used their own vehicle.

However in this study, transportation cost is taken by directly asking visitors how much they have paid for transportation or fuel. The reason behind was a more approximate price could be found from the visitors themselves as they have used various types of public transportation and the tariff of each differs. In addition for those visitors who have used their own vehicle, asking the per liter distance that their vehicle covers for every vehicle and then calculating the total liters of fuel needed for the trip then changing it into monetary term could be tedious and biased.

In case of group visitors, if the sample visitor was the one who covers the cost of the group then the total fuel price was taken to be his/her transportation cost. But, if the sample visitor was covering only his/her cost, then the total fuel price was divided among the number of people in the group and his/her share was taken as the transportation cost of that sample visitor. On the other hand, multiple site visitors' transportation cost was calculated in the following manner. Their travel cost was divided into the number of sites they have visited and the transportation cost from the immediate place they came to Lake Hawassa and to the immediate place they go from Lake Hawassa was taken. For visitors

whose origins were the town Hawassa, the round trip transportation cost from and to their home or wherever they were coming from or going to was considered.

2. Measurement of Time Cost

Time used for recreation can be allocated for alternative uses; hence time spent on a given recreational pursuit must have a cost. The value of time which is a key ingredient of the travel cost method (TCM), must be based on the notion of the opportunity cost of time. The visitor to a site sacrifices not only cash costs but also the opportunity cost of using the time in an alternative manner. (Joe Amoako-Tuffour and Roberto Marti, 2008)

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

Perhaps even more common is to use some fraction of the imputed wage to value time. The fraction ranges from 0 to 1 in the literature, although a common convention is to use 1/3 of the hourly wage as a value of time as Hellerstein (1993), Englin and Camerron (1996) and Bin et al (2005). However, Cesario (1976) used 0.43 as the fraction of the wage rate corresponding to the cost of time, Zawakcki et al (2000) and Bowker et al (1996) have used 0.25 and 0.5 as wage multiplier. Liston- Heyes and Heyes (1999) and Hagerty and Moeltner (2005) used 1/3 0f the wage. Sohngen et al (2000) and Sarker and Surry (1998) used 0.3. Hanley (1989) and Bateman et al (1996) found that using 0% (excluding time costs) and 0.025% provided them with the best fit for their data. (Joe Amoako-Tuffour and Roberto Marti, 2008)

This being the case, while measuring time cost (the opportunity cost of time), various measure were take in this study. First, for sample visitors who were students, unemployed and retirees the opportunity cost of time was taken to be zero. This is because if these groups of visitors didn't visit this site, they would not undertake any kind of paid job. The unemployed are unemployed but for the students also this is true since the culture of working a part time job by students in addition to their education is very low in Ethiopia.

Second, for the employed group of visitors, however in this study, ¼ of their hourly wage rate is used as the opportunity cost of time. This was due to the fact that most of the visitors make their visitation during weekends and on the afternoon and evening hours of weekdays when most of the samples are free of work. Therefore the researcher believes using more fractions of the hourly wage rate of visitors is overstating the opportunity cost of time.

In calculating the opportunity cost of time the following steps were followed. First, on the questionnaire each sample visitor was asked his/her weekly average working hours and this was converted into monthly working hours. Second, on the questionnaire each sample visitor was asked his/her average monthly income and this was divided by the number of monthly working hours which will give hourly wage rate. Third, on the questionnaire each sample visitor was asked the total hours the visitor took for transportation and on site visitation and it was multiplied by the hourly wage rate calculated in the second step which is then multiplied by 0.25 to get the opportunity cost of time of each visitor.

3.3.2. Other Exogenous Variables

Other exogenous variables are variables besides travel cost and that are expected to determine number of visits to Lake Hawassa. These variables are the socio- economic characteristics of the sample visitors that include age, gender, family size, income, educational level, marital status, type of employment, acquaintance to the site, visitation in group or alone, mode of transportation and cost incurred at the best alternative substitute site of each sample visitor.

Age (AGE): age is measured in terms of years. It is a common knowledge that younger people tend to travel more and long distances while as people get older they prefer more stability and tend to travel less and small distances. Therefore, a negative relationship is expected between age and number of visits to Lake Hawassa.

Gender (DGE): it is difficult to predict the relationship between gender and the number of visits to Lake Hawassa prior to any econometric analysis. Gender is treated as a dummy variable where "1" is assigned for being a male visitor and "0" for being a female visitor.

Income (INCOME): income is the means for owning the things that we need and want and for undertaking the activities we desire and which incur costs. Likewise money income is a helpful means for taking an outdoor recreational trip. Hence a positive relationship is expected between income of sample visitors and their demand for visiting Lake Hawassa. Average monthly income of visitors is taken as they have stated as income and measured in the unit "Birr".

Family size (FAMS): family size is the number of members of a family that a particular sample visitor provides for their living expenses. Family size doesn't have a direct effect on the demand for visitation; however it has an indirect effect through income of the family. As the number of individuals in a family increases it means the amount of money necessary to cover their living expenses increases which will in turn minimizes income that could be allocated for other purposes like for recreation. As a result a negative relationship is expected between family size and demand for recreational trips to Lake Hawassa.

Marital Status (DMRS): it is treated as a dummy variable where "1" is for being a single, and "0" for not being a single visitor. When we come to the relationship between marital status and recreational demand it is expected that single visitors will have higher number of visits as compared to the married ones since they relatively do not have as such family responsibilities and other family members that they provide for. However married sample visitors are believed to have more family responsibilities and higher living expenses that would minimize both their spare time and income.

Educational Level or Years of Schooling (YSCL): educational level of visitors is measured in terms of the number of years a particular sample visitor has enrolled in school. As people get more years of education they will be more informed and knowledgeable about various things of which developing a better understanding of the importance of recreation for a better and healthy life style is one. As a result a positive relation between years of schooling and the demand for recreation is expected.

Acquaintance to the site (AQUS): is measured as the number of years a particular sample visitor have experienced the site (Lake Hawassa). The better the visitors have known the area and the more experience they have on the site, the higher will be their preference to the site. Therefore, a positive relation is expected between the number of years the visitor is familiar with the site and the number of visits to the site.

Type of Employment (DEMP): here it is asked if a visitor is doing own work (self employed) or a governmental, non- governmental or private employee. It is treated as a dummy where "1" is assigned for self employees and "0" otherwise. It is expected that there will be a positive relationship between being self employed and the demand for recreation because self employed people are likely to have a flexible working hours and can easily adjust their time for various purposes. This can give them the time for recreation also. But governmental, non- governmental and private employees rather have a fixed working hour schedule and in the time left they are more likely to be engaged in different social lives and other activities which will leave them not much time for recreation.

Visitation in Group or Alone (DGR): is a dummy variable where "1" is assigned for group visits and "0" for visits that are taken alone. The relationship between this variable and the demand for recreation is difficult to be determined before any econometric analysis.

Mode of Transportation (DMOT): is treated as a dummy variable where "1" is assigned for own vehicle as a mode of transportation and "0" otherwise. It is expected that using own vehicle as a mode of transportation and number of visits to Lake Hawassa

to have a positive relationship. It is because when people have their own cars they are likely to take more trips since using own vehicle is expected to be free from discomforts of public transportation and will provide the ease and satisfaction of privacy.

Cost Incurred at Most Preferred Substitute Site (CMPSS): price of substitute good is one determinant of the demand of goods in the theory of demand. Likewise cost incurred at the best alternative substitute sites of sample visitors is also assumed to determine the number of visits to Lake Hawassa. A positive relationship is expected between the number of visits to Lake Hawassa and cost incurred at the best alternative substitute sites of sample visitors because as the price of substitute sites increases the number of visit to Lake Hawassa will increase since people will shift their visits to Lake Hawassa from their best alternative substitute site.

3.4. Empirical Model

The Truncated Model: in this study of estimating the outdoor recreational demand of Lake Hawassa data is collected from a sample of visitors that are found recreating on the site. The dependent variable which is number of visits takes only values that are equal to or greater than one, i.e., number of visits didn't assume zero values which in turn mean potential visitors of the site but who were not found at the site during the survey period are excluded. Therefore, our dependent variable, number of visits, is truncated above zero.

The truncated model for the recreation demand function was adopted from the general presentations by Greene (2000). Consider the trip generating function of the ITCM as follows:

$$V_{ij} = \beta X_i' + \varepsilon_i \quad \text{..... (3.1)}$$

Where V_{ij} is individual i's visit to site j,

X_i is vector of explanatory variables for individual i,

β s are parameters, and

ε_i is error term.

Assuming $Vij/Xi \sim N(\mu, \delta^2)$ and $\mu = \beta X_i'$,where, $\mu = \beta X_i'$ is mean and δ is standard deviation.

With truncated sampling V_{ij} is only observable if $V_{ij} \geq 1$. This implies $\beta X_i' + \varepsilon_i \geq 1$ or $\varepsilon_i \geq 1 - \beta X'_i$. Clearly it is, $E(\varepsilon_i) \geq 1 - \beta X'_i$ and is not equal to zero. In fact, it is a function of *Xi*. Thus, the residual is correlated with the explanatory variable ***Xi*** and we get inconsistent estimates of the parameters β if we use ordinary least squares (OLS) method. Given that ***Vij*** is truncated from below at ***Vij ≥ 1,*** the probability density function of the truncated variable **(*Vij*)** with mean $\mu = \beta X_i$ and standard deviation δ is given as:

$$f(V_{ij} / V_{ij} \geq 1) = \frac{f(V_{ij})}{Prob(V_{ij} \geq 1)} = \frac{(1/\delta)\,\phi[(V_{ij} - \beta X_i)/\delta]}{1 - \Phi(\alpha_i)} \quad \text{..... (3.2)}$$

Where: ϕ **(.)** is standard normal probability distribution function

Φ **(.)** is standard normal cumulative distribution function

$\alpha_i = (1 - \beta X_i)/\delta)$

$$\text{Therefore, } E(V_{ij} / V_{ij} \geq 1) = \beta X_i + \frac{\delta\,\phi[(1-\beta X_i)/\delta]}{1 - \Phi[(1-\beta X_i)/\delta]} \quad \text{..... (3.3)}$$

$$\text{Var}(V_{ij} / V_{ij} \geq 1) = \delta^2[1 - \delta(\alpha_i)] \quad \text{..... (3.4)}$$

The conditional mean is therefore a non-linear function of *X* and *β* and so is the variance. Therefore, MLE is preferred to OLS for this type of data set. Hence in the estimation of

the truncated model for estimating the outdoor recreational benefit of Lake Hawassa Maximum Likelihood Estimation (MLE) is used.

The Count Data Model: count data models are good fits for estimating recreational demand because they are models of non negative integer dependent variables. When we come to this study the estimation of the outdoor recreational demand of Lake Hawassa, the dependent variable number of visits assumes only integer values that are greater or equal to one (non negative). Hence count data models are also a good fit for this study.

Among the different count data models this study uses the Truncated Poisson Model (TPM) for estimating the recreational demand of Lake Hawassa.

The Poisson probability density function is:

$$\mathbf{Pr}\ (x_i = n) = \frac{e^{-\lambda}\ \lambda_i^{n}}{n!} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ (3.5)$$

The parameter λ_i is both the mean and variance of the distribution. The Poisson model is best suited for distributions that are free from over dispersion, i.e., when the variance is greater than the mean of the number of visits, which is a phenomenon when few people make many trips and the majority of the samples only make few trips. However, the data used in this study is free from the problem of over dispersion which will be discussed in the next chapter, the analysis part, and hence the TPM is employed in this study.

Among the different functional forms of the demand function for outdoor recreation the semi log functional form is chosen in this study.

CHAPTER FOUR

EMPIRICAL RESULTS AND DISCUSSION

In this chapter descriptive and econometric analysis of the data that is collected from 155 on site sample visitor respondents of the Lake Hawassa outdoor recreational site is presented. In the descriptive statistics the socio economic characteristics of sample visitors and other variables are discussed. In addition the general perception of visitors about the site will also be presented. In the econometric analysis the empirical results reached using the chosen model in the methodology part are discussed.

4.1. Descriptive Analysis

For enabling the reader of this study for quick reference of the different variables in our model and their representation a brief description of them is presented in the following table 4.1 even though these variables have been explained well in the methodology part of this paper.

Table 4.1 Variable Description

Variable	Description
V	Number of visits that visitors made to Lake Hawassa in the last twelve months
AGE	Age of the sample visitor in years
DGE	Dummy variable for gender of the sample visitor, where "1" is for being male and "0" for being female
DMRS	Dummy variable for marital status of the sample visitor, where "1" is for being single and "0" for not being single
DGR	Dummy variable whether the visit is taken in group or alone, where "1" is for group visit and "0" for visits made alone
DMOT	Dummy variable for mode of transportation where "1" is for using own vehicle and "0" otherwise
DEMT	Dummy variable for the type of employment of sample visitors where "1" is for being self employed and "0" otherwise
YSCL	Years of schooling i.e., the number of years the sample visitor enrolled in formal education
FAMS	Family size of sample visitors that he/she provide for
INCOME	Average monthly income of sample visitors in Birr
AQU	Visitors acquaintance to the site in years
TC	Travel cost of sample visitors
CMPSS	Cost incurred by visitors at their most preferred substitute site to Lake Hawassa in Birr

A summary of the descriptive statistics of the above variables is also presented in table 4.2. From the table the average number of visits that sample visitors made to Lake Hawassa in the previous one year was 3.42 while the minimum and maximum numbers of visits were 1 and 12 respectively. Sample visitors made these trips from various parts of our country of which 36.1% were made from Addis Ababa, 30.3% were from Hawassa and neighboring towns like Shashenene, Wendogenet and Yirgalem while the remaining 33.6% of the trips were from various towns of Ethiopia, Debre Zeit, Adama, Wollayita, Hossaina, Dilla, and Ziway being some of them. When we came to foreign visitors they were only five out of the total sample visitors but however all of them were residents of Addis Ababa for the least year being two. When we see the age of sample visitors, the minimum age being 16 and the maximum 74, the mean age of respondents was found to be 29.93 years. The average family size of respondents was calculated to be 2.23 while the average monthly income 6980.0387 Birr ranging between 75,000 Birr for the maximum and 0 Birr for the minimum. Zero birr implies that the sample visitor doesn't have his/her own income and it was true for visitors who were students and unemployed. The education level of respondents represented by the number of years the sample visitor participated in formal education showed the average number of years of schooling was 13.58 years where the maximum was 20 years and the minimum 6 years. These years represent various ranges of educational qualifications. Based on these 54.2% of sample visitors were found to be holders and enrollers of first degree and above educational level, 16.8% are students in diploma level and holders of the certificate, 25.2% are in the secondary school level and the remaining 3.9% of the respondents have only completed primary school. Acquaintance of respondents to the Lake Hawassa represented by the

number of years that sample visitors have recreational experience on the site was found to have an average value of 8.81 years. Some of the visitors have just had an experience of a year which is the minimum whereas others have as many of years of experience as their age making the maximum years of knowledge of the site 32. When we came to travel cost of respondents the mean, the maximum and minimum costs were 285.2024 birr, 3700 birr and 0 birr. Even though 0 birr does not infer any cost it is for those sample visitors with both zero opportunity cost of time and transportation cost. On the other hand, the average cost of recreation on the most preferred substitute site sample visitors was calculated to be 354.0581 Birr.

Table 4.2 Descriptive Statistics

Variable	Mean	Variance	Standard Deviation	Minimum	Maximum
V	3.42	3.3	1.8165	1	12
AGE	29.93	84.807	9.209	16	74
FAMS	2.23	3.192	1.787	1	8
INCOME	6980.0387	102705991.375	10134.39645	0	75000
YSCL	13.58	7.063	2.658	6	20
AQU	8.81	41.430	6.437	1	32
TC	285.2024	199193.479	446.31	0	3700
CMPSS	354.0581	375337.523	612.65	0	5000

Source: Survey data

In addition from table 4.3 we can see that among the sample visitors that were selected randomly on onsite recreation 112 were found to be male visitors which is 72.3% of the total sample size while the remaining 43 were females that accounted for 27.7%. Marital status is also another factor that is assumed to affect number of visits. 54 (34.8%) visitors were single visitors and the rest 101 (65.2%) are not single visitors. In general, besides the single visitors, from the total sample size, 93 (60%) are married visitors, 6 (3.9%) live in co habilitation, and only 2 (1.3%) were divorced. Visitors who came alone to the site were 48 (31%) and the other 107 (69%) visitors came to the site in group with 2.55 average group size. Public transportation was the mode of transportation for 113 (72.9%) sample visitors whereas, 42 (27.1%) of the sampled visitors used their own vehicles as a means of transportation to and from Lake Hawassa. 49 (31.6%) of the sampled visitors were self employed doing their own businesses while 106 (68.4%) engaged in various employments of governmental work, private and non-governmental works.

Table 4.3 Descriptive Statistics of Dummy Variables

Variable		Frequency	Percentage
DGE	Male	112	72.3
	Female	43	27.7
DMRS	Single	54	34.8
	Not Single	101	65.2
DGR	Group Visit	107	69
	Visits made alone	48	31
DMOT	Own Vehicle	42	27.1
	Public Transportation	113	72.9
DEMT	Self Employed	49	31.6
	Not Self Employed	106	68.4

Source: Survey Data

Visitors Preferences of Recreational Activities and Days for Recreation

Various recreational activities are found on Lake Hawassa among which enjoying the beautiful weather and scenery of the lake, swimming, boating, bird watching and photographing, and participating on outdoor fish market (very known recreational activity on Lake Hawassa) i.e., eating fish at the lake side are the major ones. Visitors were asked to rank their preference to these recreational activities and below a table summarize the most preferred activities with their respective frequencies and percentage of the sampled visitors.

Table 4.4 Most Preferred Recreational Activities of Visitors at Lake Hawassa

Most Preferred activity	Frequency	Percentage
Enjoying the Beautiful weather and scenery of the lake	123	79.3
Swimming	8	5.2
Boating	10	6.4
Bird watching and photographing	6	3.9
Participating in fish market	8	5.2

Source: Survey Data

Enjoying the Beautiful weather and scenery of the lake was the first choice of a recreational activity on Lake Hawassa for 123 sample visitors which is 79.3% of the total sample size followed by boating that got the first rank of the different activities by 10 (6.4%) sampled visitors. Swimming and participating in the fish market found equal percentage which is 5.2% of the samples preferred them most as a recreational activity. Lastly bird watching and photographing was the most enjoying recreational activity for 6 sample visitors. These being the case for preference of recreational activities, visitors also have various preferences for the days of recreation for various reasons. Based on this from the total sampled visitors of Lake Hawassa, 65.2% prefer weekends, 12.9% prefer working days, 1.3% prefer public holidays and the remaining 20.6% prefer any day that they have time whether it is weekends, working days or even public holidays

Table 4.5 Most Preferred days for recreation of visitors at Lake Hawassa

Most Preferred day for recreation	Frequency	Percentage
Weekends	101	65.2
Working days	20	12.9
Public holidays	2	1.3
Any possible day	32	20.6

Source: Survey Data

Visitors' General Perception of Lake Hawassa Outdoor Recreational Site

Visitors have also been asked to rate their experience at the time of the interview by ranking as 'more', 'as' and 'less' than they have expected. Based on this a summary of the visitors experience is presented below in Table 4.6.

Table 4.6 Visitors' Experience of Lake Hawassa Outdoor Recreational Site

Visitors' Experience of the site	Frequency	Percentage
Better than expected	61	39.4
As expected	43	27.7
Worse than expected	51	32.9

Source: Survey Data

It can be seen that 61 (39.4%) of the visitors found their recreation experience at the site, during the survey time, better than they have expected. On the other hand 51 visitors who accounted for 32.9% of the total sample size rate their experience as worse than they

have imagined and the rest 43 (27.7%) reported that their experience is as they have expected.

In addition, even if Lake Hawassa is a good area for outdoor recreation, the researcher believes there might be different problems that could be observed or experienced by visitors. Therefore an open ended question has been added in the questionnaire to get information from visitors so that remedial actions could be planned and implemented by the respective concerned bodies. From the answers that visitors have given it is possible to classify their observation as what they have noticed as problems on the Lake itself and its natural health and what they have noticed as problems on the services around the lake. Based on this, most visitors believe that even if the size of the water of the lake fluctuates over time the volume is very much decreasing recently. Also the grown grass around the edge of the lake is also believed to hider a good look at the water of the lake and minimizes the beauty of it. Lack of cleanness of the water, disposal of wastes by different bodies, and the continuous cultivation of immature fishes that are caught for the fish market are the major problems that visitors have stated that the Lake have faced. When we come to the problems visitors have said about the services the following are the major ones. Absence of clean and neat surrounding environment; lack of facilities like toilets, clean water from the pipe line, seats, waste disposal containers, etc; absence walkways around the lake and clean swimming areas; lack of recreational centers that are designed for the respective age groups; unreliable boating service both on the strength of the boats to survive difficult situations and the life saving actions that could be held if anything goes wrong during boat trips; and the very traditional nature of the service delivering areas around it were mentioned by visitors.

4.2. Econometric Analysis and Regression Results

The main purpose of this study is to estimate the outdoor recreational benefit of Lake Hawassa. In doing so the travel cost method has been employed and in the travel cost method of environmental valuation the main tasks to reach at our main objective are formulating a demand equation of outdoor recreation for the site that is under study from the results of the econometric analysis, estimating the recreational benefit from the derived demand equation and finally estimating the consumer surplus of visitors.

The demand equation of the outdoor recreation of the site explains number of visits ($\mathbf{V_{ij}}$) i.e., **V** is the dependent variable using travel cost (**TC**) and other socio – economic variables as independent variables. Furthermore, a semi-log functional form for the demand function is used in this study. Therefore, the demand function for the Lake Hawassa outdoor recreational site has the following form.

$$LnV = \beta_0 + \beta_1 TC + \beta_2 AGE + \beta_3 DGR + \beta_4 DMRS + \beta_5 DG + \beta_6 DMOT + \beta_7 DEMP + \beta_8 YSCL + \beta_9 FAMS + \beta_{10} INCOME + \beta_{11} AQU + \beta_{12} CMPSS + \varepsilon_i \quad \text{.....(4.1)}$$

Where, ε_i is an error term and each of the other variables represent their description made at the beginning of this chapter.

The Maximum Likelihood (ML) estimation is preferred than the Ordinary Least Square (OLS) estimation since the OLS will result is biased estimates of the parameters the model as it was explained in the methodology part of this study.

The number of visits is a count data that is integer and non negative and hence, a count data model is used for the econometric analysis. Among the different count data models the Truncated Poisson Model (TPM) is employed because of its suitability for this study's data. The TPM is preferred because the data is free from the problem of over

dispersion. Over dispersion appears when very few people make higher number of visits and the vast majority makes very few trips. This is reflected by a higher variance of the number visits than the mean number of visits of sample visitors. In fact in this study the variance is found to be 3.3 that is lower than the mean 3.42 for the number of trips. Therefore the data is free from the problem of over dispersion and TPM is the appropriate model for the analysis. The robust regression result of the Truncated Poisson Model is presented below in table 4.7.

Table 4.7 Maximum Likelihood regression results of Truncated Poisson Model

Explanatory Variables	Truncated Poisson Coefficients	P-Value	Marginal effect
TC	-.0005649***	0.001	-.0032985
AGE	.0129216**	0.027	.0754523
DGR	-.0892623	0.163	-.5318588
DMRS	-.0286212	0.792	-.1664383
DG	-.072677	0.284	-.430383
DMOT	.0848223	0.343	.5051644
DEMP	-.0849192	0.208	-.4883271
YSCL	-.0142645	0.345	-.0832936
FAMS	-.0341842	0.361	-.1996091
INCOME	.0000165***	0.001	.0000961
AQU	.0068306	0.152	.0398856
CMPSS	-.0000394	0.349	-.0002298
CONSTANT	1.776582***	0.000	N/A
Number of obs = 155		Log likelihood = -331.82004	
LR chi2(12) = 36.61		Pseudo R^2 = 0.0523	
Prob > chi2 = 0.0003			

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

In addition the log likelihood ratio test is used to test the significance of the model. It is estimated in the following manner.

$$LR = -2 (\text{Restricted log} - \text{Unrestricted log}) \quad (4.2)$$

Where the restricted log is the log likelihood only with constant and the unrestricted log is the log likelihood of the full model. In this study the restricted log likelihood is -350.12349 while the unrestricted log likelihood is -331.82004, thus the LR is equal to 36.6069.

On the other hand, the table (critical) value of the test with 12 degree of freedom (X^2_{12}), at 1% significance level is 26.2170 when compared; the calculated LR is higher than the critical (tabled) value. Hence we can reject the null hypothesis which says all independent variables are irrelevant at 1% significance level. Therefore, the model used in this study is significant at 1% significance level.

4.2.1 Determinants of recreational demand for Lake Hawassa Outdoor recreation site

In the demand function of outdoor recreation at Lake Hawassa different explanatory variables are used to explain the dependent variable, number of visits (V_{ij}). These independent variables were travel cost, age, gender, marital status, visit in group or alone, mode of transportation, employment type, years of schooling family size, income, acquaintance to the site and cost incurred at the most preferred substitution site.

The regression results indicate that travel cost, age and income of visitors are significant variables that affect the demand for our door recreation on lake Hawassa, while the remaining variables were found to insignificant in determining the demand.

Travel cost (TC) the main and important variable in the demand functions shows a negative and significant effect at 1% significant level as expected prior to the econometric analysis. Other things being constant when TC increases by 1 birr the number of visits to the site will decrease by 0.3%. This is also supported by the theory of demand which implies as price (TC in this case) increase quantity demanded (number of Visits) will decrease.

Visitors' income is the other significant variable at 1% level of significance. The regression result shows that the relaxation of the level of income of visitors by 1 birr will result in the change of number of visits by 0.009% in the same direction. i.e., income affects the number of visits positively. Visitors income as being the means for covering costs of recreation, it was expected to have a positive relationship with number of visits as visitors will incline to have more demand for recreation as their income increases. The result was consistent with the theory.

Age, on the contrary was found to be significant to affect number of visits positively at 5% level of significant even though it was expected to have a negative relationship with the number of visits prior to the econometric analysis, as the researcher believes young people tend to travel more than older people. According to the result and increase in age by a year will lead to 7.5% increase in number of visits to Lake Hawassa. Age giving unexpected sign needs further study to see its relationship with the demand for recreation.

4.2.2 Demand Function and Recreational Benefit Estimation

The demand function of the lake Hawassa outdoor recreational site it presented by relating number of visits with travel cost (TC). The linear semi log demand function is as follows:

$$\mathbf{LnV_{ij} = \beta_o - \beta_1\ Travel\ cost + \varepsilon_i} \text{.....(4.3)}$$

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

TC_i= individual i's travel cost

β_0= constant term

β_1= coefficient of travel cost

ε_i=residual term which is assumed to be normally distributed with mean 0 and variance δ^2 , $(0, \delta^2)$.

Thus the demand function estimated for the lake Hawassa outdoor recreational site is the following.

$$\text{Ln } V_{ij} = 1.776582 - 0.0005649\ (TC) \text{..... (4.4)}$$

A major objective of this study, i.e. estimating the recreational benefit and consumes surplus of visitors of the lake Hawassa outdoor recreational site is derived from this demand function following certain steps.

The per person recreational benefit of Lake Hawassa outdoor recreation site is estimated by calculating the area under demand curve of the above demand function. The area is

calculated by first transforming the demand function in 4.3 into an exponential function then inverting the demand function and integrating it between 0 and the average number visits (3.42). It is estimated to be Birr 1754.67 for the average number of visits. The per person per visit recreational benefit is calculated by dividing the per person recreational benefit by the average number of visits. Hence the per person per visit recreational benefit is calculated to be Birr 513.06.

In the questionnaire sample visitors were asked to attach percentage shares to the travel time to and from the site and time spent on the site. The purpose is to avoid over estimation of the recreational benefit since the travel time itself does not result in any utility according to our assumptions of the travel cost method. It was calculated to be 0.87 (87%) i.e.,average time spent for recreation on the site by visitors from the surveyed data. Therefore, multiplying the per person per visit recreational benefit with 0.87 (87%) will provide a better approximated value for recreation benefit.

87% X Birr 513.06 = Birr 446.3626

Now the next step is determining the total annual recreational benefit of the site. It is obtained by multiplying the per person per visit recreational benefit by the number of visitors that have visited (recreated on) lake Hawassa in the past 12 months (12 months before the survey period). According to the data from the Hawassa City Bureau of Culture and Tourism a total of 162, 587 visitors have visited Lake Hawassa in this period. Hence the total annual recreational benefit of Lake Hawassa is calculated as follows.

162.587 X Birr 446.3626= Birr 72,572,760.12

Therefore, the total annual outdoor recreational benefit of the site was estimated to the Birr 72,572,760.12.

Then the consumer surplus of visitors for the average number of visits is calculated as the area below the demand curve and above the average travel cost of Birr 285.2024. Hence, individual consumer surplus (CS) per person was Birr 779.275. While the per person per visit CS is estimated to be Birr 227.8583.

The total CS can be estimated in the same manner as the total recreational benefit is calculated by multiplying the per person per visit CS by the total number of visitors (162587).

165,587x Birr 227.8583= Birr 37,0446,811,82

Therefore, the total CS of visitors of Lake Hawassa outdoor recreational site is estimated to be Birr 37, 046, 811, 82.

Chapter Five

Conclusion and Policy Recommendation

5.1. Conclusion

Even if, Ethiopia is endowed with various natural sites that are suitable for outdoor recreation ,the habit of outdoor recreation among Ethiopians is low .One reason is the absence of recreation services developed on these natural sites which is also the result of limited studies on each natural site about their potential recreational benefit and source of revenue.

Lake Hawassa, no different from other natural resources in Ethiopia, is also an example. Being one of the eight rift valley lakes, it is distinguished for its nearness to the capital, cool and refreshing weather, eye catching birds and sunset view, welcoming surrounding environment and well known fish market .And the number of its visitors are increasing from time to time. However the sustainability of this potential and outdoor recreational site has been intimidated by various polluting factors and misuse of resource activities. Therefore, this study with the major objective of estimating the outdoor recreational benefit is based on a scientific calculation procedure. To estimate the outdoor recreational benefit of the lake, an individual travel cost method (ITCM) has been adopted among the various natural resource evaluation techniques in economics. A questionnaire has been used to collect data from a total of 155 on site sample visitors through face to face interview for the analysis. A maximum likelihood estimation (MLE) was preferred to the ordinary least squared estimation (OLS) as the (OLS) may lead to biased results in this

Study. In addition truncated poisson model (TPM) as employed for the benefit estimation as the data was a count data truncated above zero and it was free from over dispersion.

The regression results showed that among the different dependent variables that were used in the demand function for recreation, only travel cost (TC), age and income were found to be significant with negative, positive and positive impacts respectively on number of visits. However, the remaining variables were found to be insignificant in explaining the demand function.

The demand estimation was, on the other hand, handled using the semi log demand function. As a result the individual per trip recreational benefit was calculated as Birr 446.3626 while the total annual recreational benefit was estimated to be Birr 72,572,760,12.

As the data from the Hawassa City Bureau of Culture and Tourism, the city administration has collected a revenue Birr 35,742,172.78 from visitors in the same period which is almost less than half on the recreational benefit that is obtained (calculated) in this study.

At last a consumer surplus was also calculated as the area under the demand curve and above the average travel cost. The result shows the individual per trip consumer surplus was Birr 227.8583 while the aggregate consumer surplus was estimated to be Birr 37,046,811.82.

5.2 Policy Implication

- The city administration and potential investors have to base their decisions about current and future investments on the estimated results of the study and by comparing the potential recreational benefit with other values of the lake.
- As the health of the lake is endangered by many polluting factors, both human made activities and natural occurrences, every concerned body has to take care of this natural beauty be altering the traditional co-existence with the lake .The city administration should also enact and implement policies and rules that hinder pollution of the lake and encourage the protection of the beauty of the lake and the fauna and flora species in it.
- Investors, the society, the city administration and all concerned bodies should participate in and encourage the modernization of services and adequate provision of public goods like toilets, clean water supply, clean walk ways and sitting areas around the site.

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ADDIS ABABA UNIVERSITY

COLLAGE OF BUSINESS AND ECONOMICS

DEPARTMENT OF ECONOMICS

QUESSIONAIRE

DATE: _____ **INTERVIEW ENDED AT:_____**

INTERVIWER'S NAME: _____ **INTERVIWEE'S NO.: _____**

INTERVIEW STARTED AT: _____ **SUPERVISOR'S NAME:_____**

Dear Respondent,

My name is Selam Assefa and I am a second year masters student at Addis Ababa University department of economics specializing in Natural Resource and Environmental Economics. Currently I am undertaking a research under the topic **"ESTIMATING THE RECREATIONAL VALUE OF LAKE HAWASSA: AN APPLICATION OF ITCM"** as a partial fulfillment for completing my masters degree. Your answers for the following questions will provide the researcher the necessary information for estimating the recreational value of Lake Hawassa. So I kindly request you to take your time and answer these questions as sincerely as possible. The answers for these questions are strictly for academic purpose and the confidentiality of your answers are guaranteed. Thank you in advance for your cooperation.

PART I

Respondents' Personal Information

1. Age: _____years
2. Gender: 1. Male 2. Female
3. Marital status: 1. Single 2. Married 3. Divorced/Separated
   4. Other (eg. Cohabitation –live together without formal Marriage) please specify _____
4. What is your highest level of education?
   1. Completed primary school
   2. Completed secondary school
   3. Certificate of diploma
   4. University Degree (Undergraduate, post graduate and above)
   5. No formal education
   6. Other: please specify _____

   Please also state the number of years you have enrolled in formal education_____
5. What is your current job status?
   1. Student 2. Employed 3. Unemployed 4. Retired 5. Other: please specify _____

   If you are employed what is your occupation? _____

   On average how many hours in a week do you work? _____

6. What is your average monthly income? _____ In

   1. USD 2. EURO 3. POUND 4. BIRR 5. Other: _____

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

   No. of adults (age≥18): _____

   No. of children (age:≤ 18): _____

8. How many people in your family (including yourself) earn their own income _____ and what is their gross income _____ either from employment or business or others activities?

9. What is your nationality?

   1. Ethiopian 2. Other: _____

10. Where have you been residing before you came here (please state country)? _____

PART II

Respondents' Travel Cost Information

1. From which Ethiopian city are you making this trip to Lake Hawassa? _____

2. How many kilometers is your city from Hawassa? _____

3. Which mode of transportation did you use to & from Lake Hawassa? (Please circle the mode of transport you used)
    1. Own vehicle (private car)
    2. Rented vehicle
    3. Public transport
    4. NTO or other travel agents/ vehicle
    5. Taxi/Bajaj
    6. Others (please specify)
4. What is the amount of cost you incurred for transports in question (3) above please specify the money expenditure on fuel or tariff per round trip? _____

Questions 5, 6 , 7 and 8 are meant for visitors from abroad.

5. Which mode of transportation do you use to travel to Ethiopia?
    1. Air 2. Other(Please specify): _____

    5.1 If your answer is 1, which airlines company do you use? _____

    5.2 What is the amount of cost you incurred for this transport including returns?_____ In 1. USD 2. Euro 3. Pound 4. Birr

    5. Other: please specify_____
6. From where do you start your visitation in Ethiopia?_____
7. From where do you directly come to Lake Hawassa?_____
8. Which mode of transportation do you use from the town you directly come to Lake Hawassa to the next town you are going?
    1. Own Vehicle 2. Public Transport 3. Rented Vehicle
    4. NTO or other travel agents' vehicle 5. Other: please specify_____

8.1. What is the amount of cost you incurred for transports from the town you directly come to Lake Hawassa to the next town you are going? _____In

1. USD 2. Euro 3. Pound 4. Birr

5. Other: please specify_____

9. What is your total travel time? _____

10. When did you arrive at Lake Hawassa this time? (Day—Month—Year—E.C)? _____

11. Did you come to the site alone or in-group? 1. Alone 2. In-group

If you came in group:

11.1 How many people are in your group? _____ People

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

11.3 Are there any persons (dependents) travelling with you whom you will cover their expenses?

1. Yes 2. No

11.4 If your answer is yes, please state the number of people? _____

12. How long will you stay on the site? _____days. (From arrival to departure)

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

14. Since when did you know about Lake Hawassa? _____Years

13.1 How many years have you recreated on Lake Hawassa?_____ Years.

13.2 How many recreations to the Lake Hawassa did you take during the last 12 months? _____ trips

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

    1. Working days (Monday-Friday)

    2. Weekends (Saturday-Sunday)

    3. Public holidays

16. Have you visited other similar sites before?

    1. No 2. Yes

17. If yes, which sites did you visit? Please state (Multiple answer is possible)_____

18. What is your total cost for a visit to your most preferred substitute site if you didn't visit Lake Hawassa? _____

19. What percent of your enjoyment on the site would you assign to each of the following recreation activities in Lake Hawassa? (please make sure that your responses add to 100%)

    1. Swimming in the lake _____
    2. Enjoyment from beautiful weather and scenery of the lake_____
    3. Boating_____
    4. Bird watching & photographing_____
    5. Visiting and participating in fish market_____

Please rank the importance of the following recreational activities

1. Swimming in the lake ----------
2. Enjoyment from beautiful weather and scenery of the lake -------
3. Boating ----------
4. Bird watching & photographing ----------
5. Visiting and participating in fish market_____

20. What percent of your total recreation experience can be attributed to each of the following? (Please make sure that your responses add to 100%)
    1. Journey to and from the site ---------- %
    2. Recreation on the site ----------%
21. What is the typical total cost to you of a trip to the Lake Hawassa including round trip transportation, Equipment, supplies, food, accommodations, entertainment, etc. including for dependents on you during your travel? Birr ---------- cost to you**.**

PART III

Respondents' General Perception of and Observation of Lake Hawassa

22. How do you describe your experience of Lake Hawasssa?
    1. Better than I expected
    2. As I expected
    3. Worse than I expected

23. State problems that you encountered and observed during your visit?

_____

_____

_____

_____.

24. Why do you choose to visit Lake Hawassa?_____

_____

_____

_____.