Economic Valuation of the Recreational use value of Babogayya Lake (Bishoftu town): Application of the Individual Travel Cost Method (ITCM).

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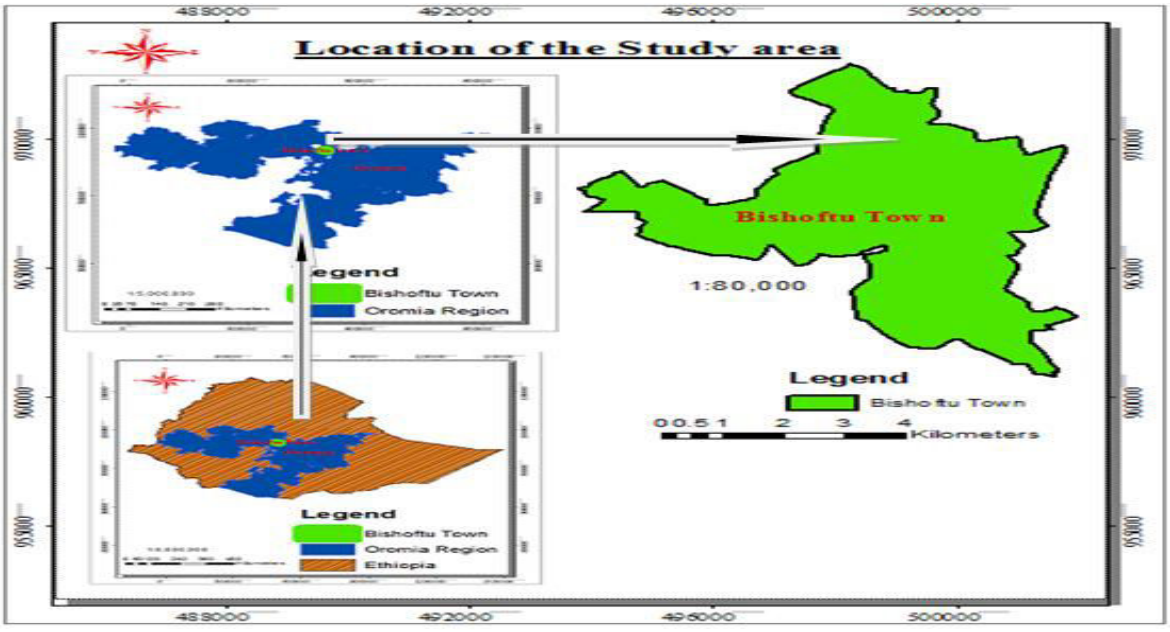
Addis Ababa, Ethiopia

BABOGAYYA LAKE





Study Site



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ABSTRACT

There are many tourist attraction sites in Ethiopia. Bishoftu town, is located in Oromia Region, Eastern Shewa Zone, on the way from Addis Ababa to Adama and some 50 km away from Addis Ababa.

This study analysis & shed light on the economic valuation of the use value of the Babogayya Lake (Bishoftu town) outdoor recreational by using the travel cost method.

Both primary & secondary data types were used. For collection of the data both structured questionnaires' and interviews were used.

For analysis of collected data both Descriptive Statistical and Econometric analysis (count data regression model (Poisson model) were employed.

The study estimated that the individual outdoor recreational demand (LnVrate= 0.5366-0.000028tc), total annual recreational benefit of the site ($90,811,935.5959) and total annual consumer surplus of the site ($39,231,916.3559).

Based on the study results possible policy implications were also provided.

Key Words: Travel cost method, Poisson regression model, Total economic benefit, Consumer surplus, total economic value, Use value, non use value, Environmental valuation technique, outdoor recreation

ACRONYMS

AIC=Akaki Information Criteria

BIC= Bayesian Information Criteria

BCTO=Bishoftu town culture and Tourism Office

CVM= Contingent valuation method

ETB=Ethiopian Birr

NUV= Non-use value

NA=Not available

ITCM=individual Travel cost method

TCM=Travel cost method

TEV=Total Economic Value

tgf= trip generation function

UV= Use Value

VIF= Variance Inflation Factor

WTP= Willingness to pay

ZTCM= Zonal Travel cost method

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CHAPTER ONE

1. Introduction

1.1 Background of the Study

1.1.1 Economic benefit of Environmental and Natural resources (Natural capital)

"Ecosystem services" refer to "The benefits of nature to households, communities, and economies." (Daily, 1997)

It is largely agreed that successful development depends on the rational use of *'natural capital.'* (World Bank, 1998)

For many centuries, the Natural Capitals (resources) were assumed as freely available resource to human without scarcity. Due to these facts the economic contribution of Natural capital in production/ consumption was neglected by the oldest School of Thought of Economics.

But, in more recent centuries the natural capital is treated as one type of capital after Ekins (1992) has disaggregated the capital stock into four different types of capital: Manufactured capital, human Capital, social/organizational Capital and natural Capital (also called ecological or environmental capital).

Pearce et al. (1990) identified four distinct types of environmental capital functions, two of which are directly relevant to the production process. The first is the provision of resources for production, the raw materials that become food, fuels, metals, timber, etc. The second is the absorption of wastes from production, both from the production process and from the disposal of consumption goods. Where these wastes add to, or improve the stock of ecological capital (e.g. through recycling or fertilization of soil by livestock), they can be regarded as investment in such capital. More frequently, where they destroy, pollute or

erode, with consequent negative impacts on the ecological, human or manufactured capital stocks, then, as agents of environmental deterioration, they can be regarded as bringing about negative investment, depreciation or capital consumption. The third type of environmental function does not contribute directly to production, but in many ways is the most important type because it provides the basic context and conditions within which production is possible at all. It comprises basic life-support functions, such as those producing climate and ecosystem stability and shielding of ultraviolet radiation by the ozone layer. The fourth type of environmental function contributes to human welfare through what may be called 'amenity services', such as the beauty of wilderness and other natural areas. Both life support functions and amenity services are produced directly by ecological capital independently of human activity, but human activity can certainly have an (often negative) effect on the responsible capital and therefore, on these functions produced by it.

De Groot (1992) has identified nine different types of values of environmental functions, grouped under the three dimensions of sustainable development:

- Ecological (conservation and existence values)
- Social (human health, personal, community and option values)
- Economic (consumptive, productive and employment values).

Moreover, According to J. Newcome, et al. (2005); Ecosystem services have been grouped into six categories broadly based on both their ecological and economic function. These are:

- Purification and Detoxification: filtration, purification and detoxification of air, water and soils;
- Cycling Processes: nutrient cycling, nitrogen fixation, carbon sequestration, soil formation;

- Regulation and Stabilization: pest and disease control, climate regulation, mitigation of storms and floods, erosion control, regulation of rainfall and water supply;
- Habitat Provision: refuge for animals and plants, storehouse for genetic material;
- Regeneration and Production: production of biomass providing raw materials and food, pollination and seed dispersal; and
- Information/Life-fulfilling: aesthetic, recreational, cultural and spiritual role, education and Research.

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

Ecosystems provide a myriad of services that contribute to human survival and quality of life. (K.Hawkins, 2003)

The insurance value of ecosystems is closely related to the systems resilience and self-organizing capacity. The notion of resilience relate to the ecosystems capacity to absorb shocks and reorganize so as to maintain its essential structure and functions, i.e., the capacity to remain at a given ecological state or avoid regime shifts (Holling,1973; Walker et al.(2004). Securing ecosystem resilience involves maintaining minimum amounts of

ecosystem infrastructure and processing capability that allows 'healthy' functioning. Such minimum ecological infrastructure can be approached through the concept of "critical natural capital" (Deutsch et al., 2003; Brand, 2009).In short, the Environment and economy relationship can be understood from the following figure like diagram.

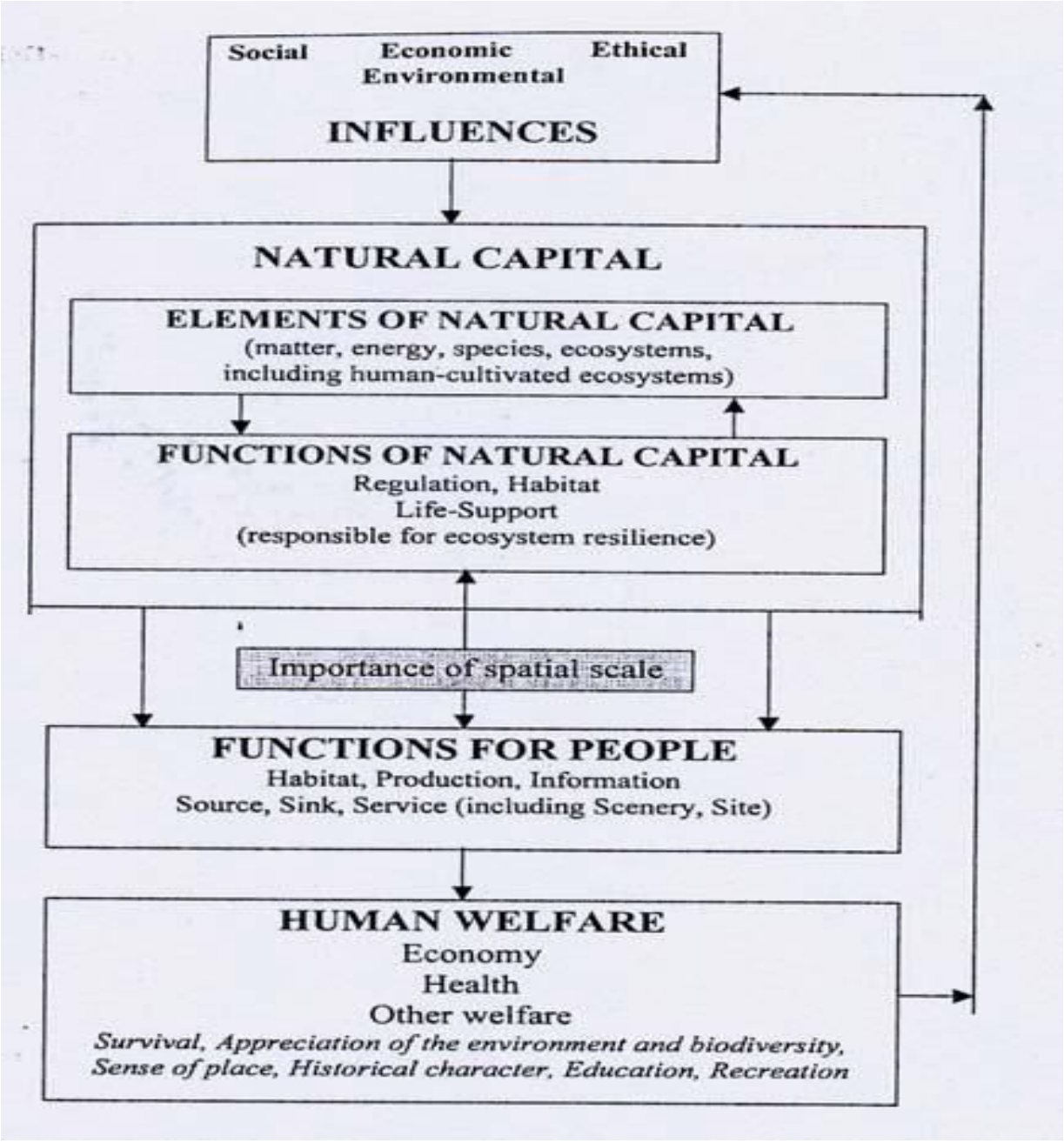


Figure.1.1 Environmental functions and attributes: human influences and welfare.

Adopted from: (Elkins, Paul; et al. 2003)

Table 1.1. Relationship between environmental attributes, values and function types, from different classifications.

Environmental attributes (CAG and LUC, 1997)	Environmental functions (DeGroot et al.2002)	Environmental values (De Groot, 1992)
Health/survival Ecological	Regulation / habitat	conservation; social health
biodiversity	habitat	Ecological conservation, existence
Appreciation of environment	Information,	habitat Social (personal, option), economic
Sense of place	Information,	Habitat, Social,(community, option),economic
Historical character	Information,	Habitat, Social (community, option),economic
Education	information	Social(personal, community, option),economic
Recreation	Information, habitat	Social (community, option),economic
Value to the local economy	Production, information	economic

The economies of developing countries are heavily reliant on natural resources than developed economies, and hence, ecosystem services provide dominant contribution for their economy. For instance, source income (employments), major exports in agricultural commodities, fish, timber and minerals, &etc.

Besides, large proportion of the rural poor depends on ecosystem services for survival (e.g. through small-scale agriculture and the harvesting of products) and is most sensitive to changes in provision or quality of ecosystem services.

Therefore, giving emphasis to the natural and environmental resource is one of the strong weapons to fight against poverty and its consequences in developing countries like Ethiopia where agriculture is the backbone of the economy. Sustainable development of the

agricultural sector more depends on knowing value, conservations and protection of all natural resource.

Nature based recreational service one of the product of the ecosystem service. It is more appropriately considered a benefit produced using both ecological services and conventional goods and services. Recreational benefits arise from the joint use of final ecosystem services and conventional goods and services.

Economists, engineers and various other federal agency planners have made noble attempts to estimate the recreation expenditure impacts and/or the benefits generated in both the regional and national economy by the high levels of recreation use at public lakes. The result of the attempt reflect provision of outdoor recreation facilities and services have good contribution for economy through: (1) making a significant contribution to national employment (jobs creation), increasing income and output of goods and services; or (2) little significance nationally and make only minor and/or seasonal contributions to local and regional economies. (Schreiner, et al. 1985)

Outdoor recreational opportunities (lakes, rivers, parks, world heritage sites, multi-use trials) are also becoming a major part of the rural economy through generation of job opportunity and income.

Even though, ecosystems function or biodiversities have numerous benefits; their values are degraded due to different local, national or global factors*?* These are:

- **Unsustainable or unbalanced production and consumption patterns**. When Consumption pattern is greater than production process.

- ***Market and economic policy failures*:** such as perverse subsidies, absence of markets for ecosystem goods and services, and inadequate or non-existent information about the value of goods and services;
- ***Issues of governance*:** such as absence of clearly defined and secure property rights, clear environmental policies and policy goals, poor enforcement of existing regulation, corruption, lack of political will, lack of capacity and inadequate information and knowledge; and
- ***Global demographic and other factors*:** such as human population growth, poverty, wars and unrest. Action is required at both national and international levels to address these drivers and ensure that increased economic development does not threaten the continued provision of ecosystems goods and services.

What is outdoor Recreation?

Recreation is defined as any form of experience pursued more probably during leisure time in which an individual engage in desired recreational activities in preferred physical and social settings in order to experience desired and expected psychological benefits. However, recreation might be even within or without confined buildings. A recreation in natural environment is called outdoor recreation and it is defined that activities that are undertaken outside the confines of buildings (i.e., in the outdoors); do not involve organized competition or formal rules (these are referred to as sports activities); can be undertaken without the existence of any built facility or infrastructure; may require large areas of land, water and/or air; and may require outdoor areas of predominantly unmodified natural landscape(Veal 2004).However, as a working definition recreation in Lakes around Bishoftu town comprises both outdoor and confined sorts hence it consists of all body of the Lake as an outdoor and Buildings(houses) as confined recreational site

.

Recreation is accredited to be one of the essential human needs for economic, social and health benefits. For example it helps in maintaining and improving health, making friends with different backgrounds, and engaging in community life (Dattilo, 2002; USA Office of Surgeon General, 2009, Outdoor Industry Association, 2012).

1.2 Statement of problem

Environmental and natural resource systems such as lakes, rivers, streams, estuaries, forests, and parks provide goods in terms of resources (e.g., flora, fauna, and minerals) and services (e.g., waste sink assimilation), a source of amenity services, use for recreational purposes, and life-support functions.(Himayatullah,2003)

Ever since the second half of the twentieth century, concern about current and future use of our natural resources and environment has emerged at an increasing rate. Presently, both benefits and threats have been observed resulting from the growing importance of ecotourism in environmentally sensitive areas. (Nillesen, 2002)

Knowledge of the values of these services may be important for a variety of reasons. But, access to such resources for recreation is typically not allocated through normal markets functions.

Environmental valuation is more concerned with determining the monetary values to scarce natural and environmental resources.

As synthesized by Pearce and Turner (1990), economic value is not an intrinsic quality of anything: it only occurs because of the interaction between a subject and an object. It follows that environmental attributes have value only if they enter at least one individual's utility function or a firm's production function. Attributes failing either ofthese criteria have no economic value (Hanley and Spash, 1993). By functional expression, $U_t = F(X_t, R_t \ldots)$ where

X= consumed Commodities, Rt= Recreational service (Aesthetic Value) and $X_t=F(L_t,K_t\ldots.)$ where Lt= labor and Kt= capital

Before we try to judge the monetary value of any natural tourism site/environmental assets; we should be sure that the Environmental assets has demand either by firms or Consumers and after that we should assume that demand for that environmental assets are a normal demand/economic good.

Environmental Valuation technique is a method that has been developed for valuing the environmental goods and services (recreational services) which can't be valued through conventional force of supply and demand(market economy/ "invisible hand" of the market).This technique is sometimes called as **non-market valuation method**. Unlike other marketable goods, values of environmental goods and services cannot easily be determined. Because of the difficulty to evaluate the economic value of nature based (outdoor) recreational benefit, it is necessary to use discounting of recreational benefits or concerned with non-market methods.

Natural resources have value even when no expenditures are made while participating. Beyond what consumers actually spend to engage in a recreation pursuits, there is a surplus value of what they would actually be willing to pay for that recreation opportunity. This surplus is an important part of the valuation of the outdoor recreation experience and is critical in assessing the value of the nearby recreation facilities that residents are able to use without incurring significant user fees. (Otto, et al., 2000)

In the 21st century, economic valuation is applied in both developed and developing countries in the area of environmental and natural resources such as air and water quality improvement, on wildlife conservation and recreational/amenity service(from natural and artificial protected areas services, wilderness, Cultural heritages, lakes, rivers, etc).

Environmental valuations have many advantages. Navrud and Pruckner (1997) identify five main fields of application for environmental valuation methods; namely,

A. **Valuation of alternative projects:** Valuation results provide structured information regarding the social value of the impacts of alternative environmental projects (NIJKAMP et al., 1990), delivering estimations of the social costs and social benefits of different policies (Hanley And Spash, 1993).

B. **Valuation of new legislations:** Valuations and the availability of useful valuation methods are also required by the development of new regulations that aim at internalizing an externality (Hanley And Spash,1993). That means, for instance, in designing taxes to cover social costs imposed by human actions in cases when prices do not reflect their full costs (Edwards-Jones, 2000).For instance, are pollution taxes which are designed to cover the social costs implied by polluters (Hanley And Spash,1993).

C. **Resource damage assessment:** it is the estimation of how a specific damage alters the value of an environmental good or service. (Navrud And Pruckner, 1997) For example physical damage of release of hazardous waste materials to environment.

D. Environmental costing: Estimating the cost of internalizing externalities through changes in product prices.

E. Environmental accounting: it aims at adding the value of environmental goods and services in the social benefit of the market economy. (Navrud And Pruckner, 1997).

In common usage, the term *value* means importance or desirability. The transfer between general usage and each discipline's perspective on how importance or desirability should be gauged has created considerable debate among ecologists, economists, and philosophers."*Valuation can simply be defined as an attempt to put monetary values on environmental goods and services or natural resources".*

In Ethiopia for several years, any government body didn't take any major measures to improve the quality of environmental services due to the fact that they do not have a scientific estimate of environmental benefit of the site and adequate information and knowledge about the economic value of this recreational site. Due to this they are not able to take measure to improve the potential environmental benefit of the site by expanding varieties of services that the town can supply. Consequently, the quality of the site may deteriorate over time, which could force visitors of the site to shift to other substitute sites. This phenomenon may, over time, result in an irreversible damage to the different environmental resources on the site as well as to the state of business. Much tourism attractive places more depends on the environmental services (natural, cultural, or partly man-made and partly natural) at the destinations of tourists.

Recreation is a human activity that mostly undertaken during leisure time. Such activities increases visitor's utility or satisfaction. Nature based Recreational sites are the product of natural resources, so that they are resource endowments of a nation. Thus, there is a need to have some ways to put an economic estimate to recreation sites though values are not easily determined in conventional market situations.

Although Ethiopia is among the world leaders in terms of natural and environmental resource & many Cultural heritages endowments, the application of environmental valuation (mostly on tourism sector) was not developed yet, in Ethiopia like other countries.

In Ethiopia there are some recent studies undertaken concerning environmental valuations in different recreational sites. For example, Sitotaw (et al. 2003),(Langano recreation site), economic values of recreation sites, lakes and other natural resources in Ethiopia are not properly examined with appropriate and well defined scientific approaches. The quality of this resource is therefore deteriorating due to lack of proper management of 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. Mesfin(2010) on "Estimating the economic value of a recreational wetland ecosystem Wondo Genet". Andualem (2011) study on "Estimating the economic value of wildlife: the case of Addis Ababa lions zoo park."

Natural resource systems such as lakes, rivers, streams, estuaries, forests and parks are used extensively by people for various kinds of recreational activities. Natural resource systems provide valuable services to people. From an economic perspective, these services have two important features. The first is that the economic value of these services depends upon the characteristics of the natural resource system. Knowledge of the values of these services may be important for a variety of resource management decisions. The second important feature is that access to the resource for recreation is typically not allocated through the markets. Rather, access is typically open to all visitors at a zero price or a nominal entrance fee that bears no relationship to the cost of providing access. And there is no or little variation in these access prices over time or across sites to provide data for the econometric estimation of demand functions (Freeman, 1993).

Apart from this general problem, Bishoftu town (city of lakes) recreation site is a widely known town since ancient periods as center of both natural and artificial (cultural) recreation sites for both foreigners and domestic visitors. So, it is prominent in its amenity of the naturally topography (eight gorge mountains), lakes (7 Crater lakes) and cool weather conditions. This enhances the tourist attraction potential the town. In past, there are some direct or indirect indicators of high demand for recreational and other activities in Bishoftu town. First, Construction of the multi-purpose Palace of Emperor Haile Silasse (Fair field) that used for "*recreational site" and bath purpose." Second,* historically, the prime minister

of the Libya, Gadafi and the American president, George Bush had visited and admired the natural beauty of Bishoftu lakes. Additionally, now a days, Bishoftu town is one of the largest and known tourist destination in Ethiopia and the Bishoftu Town Administration has a plan to make Bishoftu one of the best tourist destination town in Africa and the world. This vision comes from high demand for recreation in the town.

Hence, due to existence of high demand for recreational service, the researcher need to estimate the recreational value of the site which could help the site authorities to be aware of how much revenue they can extract out of the benefit of consumers by improving the qualities of the recreation site and expand the varieties of its potential services.

Previously, there were only three studies which were conducted on tourism related topics in Bishoftu. The first study was by Meselu (2010) on "land use in relation to tourism" and he tried to analyze the possibilities of ecotourism project development on Lake Hora. The second, study was by Sisay (2010) on "How to integrate the tourism development among the four Lakes in the town." The third study was by Hiwot (2013) "Assessment of challenges and opportunities of sustainable tourism development."

In short, since the above past studies not emphasized on environmental valuation areas, they never correlated with my research topic. Therefore, the current study is particularly aimed at addressing the research gab by trying to value the recreational services provided by different resorts (Babogayya, Adulala & Etalem) and Salayish lodge and parks and forecast their recreational demand. Concerning the estimation of economic value of Bishoftu recreational sites, there is no research conducted. Due to these facts the researcher wants to fill this research gab.

1.3 Research Questions

a. What is the Babogayya Lake recreational use value? so what is the recreational demand?
b. What are the factors that affect visitation rate of visitors of Babogayya Lake recreation site?

1.4 Hypothesis

In the modern world, if there is economic development with rapid development of technology and globalization an increase in demand for out-door recreation inevitable.

1.5 Objectives of the Study

1.5.1 General objective of the study

The general objective of the study is to numerically estimate the total economic use value of the Bishoftu town recreational sites (Babogayya resort, Adulala Resort and Etalem Resort) based on the need of different visitors from different corners of the world.

1.5.2 Specific objectives of the study

- To identify the socio-economic and demographic characteristics those determine the visitation rate for Bishoftu town recreational site (Babogayya Lake).
- To estimate recreational demand for the site and approximate the environmental benefit.
- To determine consumer surplus for recreational amenities/ services of Bishoftu town recreational site (Babogayya Lake).
- Based on the findings, the study forwards policy implications toward the use and conservation of the recreational site.

1.6 Significance of the study

After the first attempt has been made by Clawson and Knetsch (1966) on recreational demand assessment, many research works has been done in many developed world. But

due to lack of information and awareness little attempt has been made in developing world, despite the important role that recreational areas are playing in their tourism industries.

Valuation including economic valuation can serve as a tool for self-reflection which helps people rethink about their relations to the natural environment and increase knowledge about the consequences of consumption choices and behavior for distant places and people. (Zografos, Kumar,et al.2010).

Information on the economic valuations of ecosystems services or goods can be used to redress market and policy failures through creating awareness on the payments for ecosystem services, creation of markets for services, or other incentives for sustainable resource management.

Environmental valuation study may help how quantitative estimates can be made of the economic benefit of a recreation site. By doing so the research work will attempts to add to the limited empirical literature in the area in Ethiopia.

The results of this study may also help policy makers take policy-oriented decisions for better planning and management of limited natural and environmental resources. Furthermore, it could be used as an input for comprehensive and rigorous policy oriented research work in the area of environmental economics. (Sitotaw, et al. 2003)

1.7 Limitation of the Study

With regard to methodological issues it should be noted that low levels of literacy, education and language creates barriers to valuing complex environmental goods, as well as creating difficulties for utilizing traditional survey techniques such as questionnaires and interviews. More deliberative and participatory approaches to data collection may overcome these issues (Bourque and Fielder, 1995, Jackson and Ingles, 1998; Asia Forest Network, 2002, Fazey et al., 2007).

Most respondents (visitors) coming to recreational site are for refreshment and doing some leisure activities so that they are very reluctant to respond to questionnaire.

Additionally, the there is budgetary and time constraints for this study. There are also limited numbers of secondary data for analysis.

1.8 Scope of the study

The scope of the study will be limited to the economic valuations (estimation of recreational (use value) demand or benefits) of out-door recreational sites of Bishoftu town. For specification of the study, Babogayya Lake which is the largest and surrounded by many resorts and recreational centers was selected for the study. Due to its numerous visitors and its large size; it is selected for the study purpose. These are Babogayya Resort, Adulala Resort, Etalem Resort and Babogayya Recreational center. Foreign visitors which are multi-site visitors and multi-purpose are not included in this recreational site valuation study. Because, the study focus on the single site model of recreational site demand estimation.

CHAPTER TWO

2.0 Literature Reviews

2.1 Theoretical Literature Reviews

2.1.1 Concepts of Economic Environmental valuation

In economics, valuation concepts relate to human welfare. So the economic value of an ecosystem function or service is the contribution it makes to human welfare, where human welfare is measured in terms of each individual's own assessment of his or her well-being. The economist's concept of value has a long history. For over fifty years economists have analyzed the properties of the logically consistent constructs that support answers to two types of questions: How does one determine whether any given individual is better off with a (policy) change or without it? And how does one add up the gains or losses experienced by different individuals in society as a result of a given (policy) change? The answers to these questions recognize that an absolute measure of a person's value for something is unachievable. Moreover, even if it were, aggregations of such measures over individuals would have little meaning (Baumol 1952, Samuelson 1956, Sen 1982).

Economists "value" things only in comparative terms. When they say they are valuing a change, economists are really defining a trade-off between two situations. The economic value of a policy change is defined by the amount (either positive or negative) of compensation that an individual would need in order to be as well off (by his own reckoning of well being) as he would have been without the policy-induced change (Hicks, 1939, Kaldor 1939).

Besides, as valuation concepts relate to human welfare; where human welfare is measured in terms of each individual's own assessment of his or her well-being. (N.Bockstael, Free Man,III, et al. 2000).

Economic valuation of a given good or services emerge from the existence of the scarcity of resources. Economic valuation of the environmental goods or services emerged from the rising of the demand for environmental goods or service due to decline of the availability of the Environmental and natural resource (green infrastructure) amenities from period to period.

Economic value is a measure of what the maximum amount an individual is willing to forego in other goods and services in order to obtain some good, service, or state of the world.

Environmental valuation is a series of techniques that economists use to assess the economic value of market and non-market goods (natural resources and resource services). Environmental valuation is the application of welfare economics when the differences in circumstances relate to the uses or states of natural resources or the quality of the environment. Inversely, Environmental deterioration can be defined as "the loss of capital-nature".

In short, economic valuation is the process of identifying the relevant changes in consumer demand and producer supply arising from a (project-induced) change in environmental quality, or the change in the provision of an environmental resource. Besides, Environmental Valuation is concerned with the analysis of methods for obtaining empirical estimates of environmental values, such as the benefits of improved river water quality, or the cost of losing an area of wilderness to development.

In monetary valuation studies of the environment, using the contingent valuation or other methods, economists typically estimate the (maximum) willingness to pay (WTP) which equals the change in consumer surplus. The consumer surplus approximates welfare change because there is no producer and no producer surplus for natural resources. (Richard, et.al, 2005).

Environmental Valuation is the heart of environmental economics and it became a very active and gets prioritized emphasis by many scholars in modern world.

2.1.2 Benefits of Economic Valuations of Natural and Environmental Resources

Social systems and ecosystems are strongly interlinked, forming social-ecological systems (SES; Folke et al. 2003, Turner et al. 2003, Ostrom, 2009).

The continued demand for environmental quality as manifested by outdoor recreation participation coupled with reductions in funding for resource management increases the importance of obtaining reliable measures of relative economic value of environmental resource. The values of outdoor recreation resources are not directly observable in the marketplace. (Sukanya Das, et al.2013)

Environmental valuation techniques can provide useful evidence to support habitat conservation policies by quantifying the economic value associated with the protection of biological resources (Hanley and Shogren, 2001).

Pearce (2001) argues that the measurement of the economic value of biodiversity is a fundamental step in conserving this resource, since "The pressures to reduce biodiversity are so large that the chances that we will introduce incentives [for the protection of biodiversity] without demonstrating the economic value of biodiversity are much less than if we do engage in valuation";By assigning monetary values to biodiversity, the benefits associated with biodiversity can directly be compared with the economic value of alternative resource use options (Nunes and van den Bergh, 2001).

"Environmental accounting" becomes the paradigm of the conservation and preservation of such capital by the same standards of an enterprise patrimony. Environmental goods

valuation can be a prerequisite in order to control and contain the damages caused by man to the environment (Bishop and Woodward et al.1995).

Although a significant proportion of the economic value is potentially recoverable through entrance fees, tourism expenditure typically forms the basis of profits of tour operators, who may not necessarily be locally or even nationally based. In order to capture larger proportions of the economic value of ecotourism, the results of economic valuation studies have been used to set fees charged to visitors to lakes (IIED, 2003).

Economic taxonomy of the Natural and Environmental Resource Services (green infrastructure) Ecosystems and their services are economically valuable if they serve and have power to satisfy human needs/wants. Economic values for the non-market services of natural ecosystems, services that contribute to human health and to quality of life, can sometimes be derived from people's decisions to use related resources or to substitute other resources when the natural ecosystem's quality is impaired (e.g. Bockstae et al.1990, Smith and Huang 1995, and Bartik 1988).

Environmental valuation techniques can provide useful evidence to support habitat conservation policies by quantifying the economic value associated with the protection of biological resources (Hanley and Shogren, 2001).Pearce (2001 et al.) argues that the measurement of the economic value of biodiversity is a fundamental step in conserving this resource, since "the pressures to reduce biodiversity are so large that the chances that we will introduce incentives [for the protection of biodiversity] without demonstrating the economic value of biodiversity are much less than if we do engage in valuation"; Ecosystems and the biological diversity contained within them provide a stream of goods and services, the continued delivery of which remains essential to our economic prosperity and other aspects of our welfare.

In the environmental economics literature we can see several ways of classifying values of environmental resources. Freeman (1979), and Mitchell and Carson (1989) have presented classifications of resource benefits from environmental improvements perspectives.

Freeman (1993) has classified environmental service flows in terms of their 3 different sets of features: one way of classifying environmental resource service flows is according to the legal and administrative responsibilities for controlling the pollution or damage that would occur on different environmental resources (e.g. air, water, fisheries, forests, etc); another way of categorizing environmental resource benefits is in terms of their effects on humans either directly (e.g. on human health) or indirectly (e.g. through impacts on ecosystem and inanimate systems). Finally, environmental resource benefits are grouped according to their effects on the market system (e.g., in the form of changes in incomes to producers and impacts on consumers in the form of changes in the availability of and prices of marketed goods and services).

Loomis et al. (1987) classified natural resource values by their use values and non-use values. The analysis of total economic benefits of environmental resources can in general be broken down into two categories: use values and non-use values.

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).

According to Andualem Goshu (2011), 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 of environmental resources. For example, values associated with the ability to benefit from supply of fish in an unpolluted lake, obtaining timber from forest, etc. Indirect use values 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, boating, hunting, etc. and ecological diversity, stability, etc). These ecosystem impacts of environmental resources have some indirect use values.

i. **Option values:** it corresponds to the values that people attach to environmental resources that they may use in the future though they do not use them currently. It is value that individuals are willing to pay for the future use of the resource (e.g. future visits to lakes, clean surface and ground water, avoiding of erosion to enable future use of pastures).

   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.

ii. **Quasi-option values:** are 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.

iii. **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. This relates to the willingness to pay for preserving existing habitats, species and ecosystems. It also includes the willingness to pay to prevent for irreversible changes (for example: extinction of species).

iv. **Existence values:** it is derived simply from the satisfaction of knowing that ecosystems continue to exist, whether or not this might also benefit others (also associated with 'intrinsic value')and 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.

v. This non-use value reflects the "moral" or philosophical reasons for environmental protection, unrelated to any current or future use. It is related to the for example the scientific society and the value from knowledge of continued existence of species, habitats and ecosystems.

Economists divide values into two main categories: use value and non-use value.

a. **Use values:** derived from physical involvement with some aspect of an ecosystem. One type of use value is direct, such as logging, fishing, recreation, and tourism, while another is indirect. Direct use is further divided into consumptive (logging, fishing) and non-consumptive (recreation, tourism) values. There are also indirect use values, which arise from supporting humans or what humans directly use. Regulation and habitat functions, such as flood control, climate regulation, and waste assimilation would fall into this category

(Adamowicz 199; Brown et al. 1993; Edwards and Abivardi 1998; Goulder and Kennedy, 1997).

b. **Non-use values**: do not involve physical interaction. This includes existence &bequest values. Existence value (passive use) is derived from the satisfaction of knowing that a certain species or ecosystem exists, even if it will never be seen or used. Bequest value is satisfaction from being able to pass on environmental benefits to future generations (Adamowicz 1991; Edwards and Abivardi 1998). There are various recreational services provided by lakes and rivers—fishing, swimming, boating, hunting, picnicking, or nature appreciation in general—are all enhanced by the body of water's natural beauty. Economists can estimate the value of these recreational services as well as how that value changes as the aesthetic quality of a lake or river changes.

The total economic value (TEV) of environmental resources is sum of use values (UV) and non-use values (NUV). Mathematically, $TEV=UV+NUV$

Total recreational use value (TRV) is one of the components of the total economic value.

Total recreations use values (benefits) are defined as the sum of the maximum amount individuals are willing to pay to engage in a recreation activity, rather than forego it (Walsh, 1986).

Relatively, use values are often easier to assess than non use values. Direct Use value; involves human interaction with the ecosystem itself rather than via the services it provides. It may be consumptive or extractive use, such as fisheries or timber, or it may be non-consumptive, as with some recreational and educational activities.

Direct use value is the most obvious value category, as the economic benefits can be calculated by making use of market information. The outputs of the resource can be consumed directly: Forest may yield annually a certain amount of wood that can be sold or used for heating and construction (number of timber produced and sold).

Pastures provide space for some livestock. Lakes provide fish to fisherman; and enjoying nature (recreation).Many studies show that cleaner air (a natural resource) leads to less respiratory diseases and considerably less mortality. So, health costs can be influenced positively by improving air quality.

As the output (clean air) can be consumed directly, it is still classified as “direct use”, but assessing the money value will already be more difficult than indirect use. This might, for example, include the removal of nutrients, providing cleaner water to those downstream, the prevention of downstream flooding and diseases and provision of information. Indirect use of natural recourses relates to functional benefits, the outputs provide a social benefit from ecosystem functioning (e.g. water purification, erosion protection or carbon sequestration).

In general, Environmental Economics emphasize with total economic value (TEV) which is the sum of both uses value and non-use value. Generally, we can describe the taxonomy of Environmental value as follows.

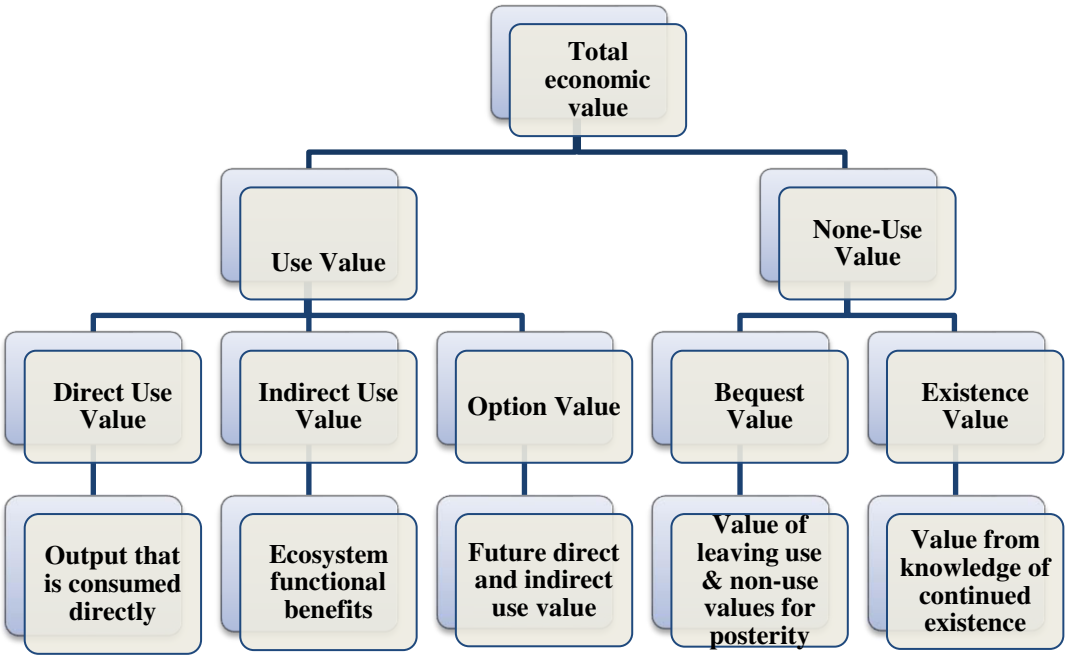


Figure 2.1: Taxonomy of Environmental Resource Values adapted from Lesser et al. (1997)

An economic assessment of ecosystem benefits and opportunity costs is one important element of the information set that must go into social decision making, even though a simple cost–benefit test cannot determine what actions are appropriate. By laying out the economic and non-economic information in a way that facilitates both informed decision making and accountability, competing values can be better reconciled (Kopp et al.1997; Toman, 1998).

2.1.3 Economic Valuation Methods of the Natural and Environmental Resources

An application of the welfare economics method for valuating non-marketable Natural and Environmental Resources has a significant role for the efficient allocation especially for the public goods or quasi-public goods. Without the observable price and quantity data that are available when goods or services are traded in the market, economists have devised innovative techniques for measuring changes in value for natural resources and the environment. Participating in outdoor recreation typically involves expenditures such as travel, food, supplies, and specialized equipment (e.g., bikes, fishing tackle, hunting

equipment, licenses, and special clothing). Identifying and measuring these expenses is one way to estimate the value people place on a particular recreational activity.

Several market type methodologies have been designed by neo-classicalists to value non-market goods. These methodologies have their own common foundations. The fundamental assumption is that the value of all goods can be expressed in money equivalent terms and that value is based on a good's utility to humans. There are three basic assumptions of neo-classicalists in environmental valuation. First, that utility functions exist; second, that a utility function exists that can value non-market goods in rank order; and that these value rankings of non-market goods can be empirically identified by the TC and CV methods. *(Eberle& Hayden, 1991)*

Within the TEV framework, values are derived, if available, from information of individual behavior provided by market transactions relating directly to the ecosystem service. In the absence of such information, price information must be derived from parallel market transactions that are associated indirectly with the good to be valued. If both direct and indirect price information on ecosystem services is absent, hypothetical markets may be created in order to elicit values. These situations correspond to a common categorization of the available techniques used to value ecosystem services: (a) direct market valuation approaches, (b) revealed preference approaches and (c) stated preferences approaches. (Chee, 2004)

1. **Direct "Stated Preference" Methods**

a. ***Contingent valuation method (CV)*:** Uses questionnaires to ask people how much they would be willing to pay to increase or enhance the provision of an ecosystem service, or alternatively, how much they would be willing to accept for its loss or degradation. The contingent valuation method (Mitchell and Carson 1989; Bateman and Willis 1999) is a

stated preference approach that directly elicits willingness (and ability) to pay statements from survey respondents. In other words, respondents are directly asked about their willingness to pay (i.e., change in consumer surplus) for environmental improvement or willingness to accept (i.e. amount of monetary compensation required to allow) environmental degradation. The method involves the development of a hypothetical market via in-person, telephone, mail, or other types of surveys. In the hypothetical market respondents are informed about the current problem and the policy designed to mitigate the problem. Statistical analysis of these data leads to the development of willingness to pay and consumer surplus estimates.

A. **Choice modeling (CM)**: Attempts to model the decision process of an individual in a given context (Hanley and Wright, 1998; Philip and MacMillan, 2005). Individuals are faced with two or more alternatives with shared attributes of the services to be valued, but with different levels of attribute (one of the attributes being the money people would have to pay for the service).

B. **Group valuation:** Combines stated preference techniques with elements of deliberative processes from political science (Spash, 2001; Wilson and Howarth, 2002), and are being increasingly used as a way to capture value types that may escape individual based surveys, such as value pluralism, incommensurability, non-human values, or social justice (Spash, 2008).

The Strength of the direct or stated preference approaches is their flexibility. Direct approaches can be used to construct realistic policy scenarios for any new policy. Oftentimes, hypothetical choices are the only way to gain policy relevant nonmarket benefit information. Moreover, Strength of the direct approaches, especially contingent valuation, is the ability to measure nonuse values, such as the value of improving aquatic ecosystems, improving of

quality of environments etc. The major weakness of the direct approaches is their hypothetical nature.

2. Indirect "Revealed Preference" Methods

A. **The travel cost method:** (Bockstael, 1995) is a revealed preference method that is most often used to estimate the benefits of outdoor recreation. The travel cost method begins with the insight that the major cost of outdoor recreation is the travel and time costs incurred to get to the recreation site. Since individuals reside at varying distances from the creation site, the variation in distance and the number of trips taken are used to trace out a demand curve for the recreation site. The demand curve is then used to derive the consumer surplus associated with using the site. With data on appropriate demand curve shift variables (i.e., independent variables such as measures of environmental quality), the economic benefits (i.e., changes in consumer surplus) associated with changes in the shift variables (i.e., changes in water quality) can be derived.

B. **The hedonic price method:** (Palmquist 1991; Freeman1993) exploits the relationship between character- quality, and housing prices and wages. Job markets with greater environmental amenities are associated with lower wages relative to other job markets because individuals are willing to accept lower wages in order to gain greater amenities. The hedonic pricing (HP) approach utilizes information about the implicit demand for an environmental attribute of marketed commodities. By estimating a demand function for property, the analyst can infer the value of a change in the non-marketed environmental benefits generated by the environmental good.

The major strength of indirect approaches is that they are based on data reflecting actual market choices, where individuals bear the actual costs and benefits of their actions. However, indirect methods are generally only suitable for the estimation of use value, as non-use value may not be reflected in market choices and behavior. The major weakness of

indirect approaches is their reliance on historical data. Policies often are beyond the range of historical experience.

A revealed preference approach to non-market valuation has been widely used since the famous Hotel ling's letter of 1947 to the Director of the Nation Park Service of the United States suggesting a travel cost recreation demand approach to value the natural resources (Smith and Kaoru, 1990). Since, then, the application of the TCM has been widespread in valuing numerous types of natural resources and the environment. Among others, outdoor recreational resource valuation may be one of the most prolific areas of TCM applications (Walsh et al. 1992; Sturtevant et al. 1998; Murkowski et al. 1997; Loomis et al. 1999).

Travel Cost Method (TCM) is a well-established technique for valuing outdoor recreational benefits. In TCM we measure the total cost of the visit that includes monetary and non-monetary costs, and through simple assumptions we derive the demand curve for the site and can estimate recreational benefits. The costs of visit in a park include: (a) out of pocket expenditures: entrance fees, fuel costs, equipment costs, accommodation costs and (b) non-monetary expenditures: value of enjoyment or discomfort while travelling and value of time consumed in travel and stay on-site.(Baron and Blekhman,2002).

Table 2.2: Monetary Valuation Methods and values: examples from the literature

Method			Comment /example	References
Market valuation	Market Price		Mainly applicable to the "goods" (e.g. fish) but also some cultural (e.g. recreation) and regulating services (e.g. pollination).	Brown et al. 1990; Kanazawa 1993
Cost based	Avoided cost		The value of the flood control service can be derived from the estimated damage if flooding would occur.	Gunawardena & Rowan 2005; Ammour et al. 2000; Breaux et al. 1995; Gren 1993
	Replacement cost		The value of groundwater recharge can be estimated from the costs of obtaining water from another source (substitute costs).	
	Mitigation/ restoration costs		E.g. cost of preventive expenditures in absence of wetland service (e.g. flood barriers) or relocation.	
Production function / factor income	How soil fertility improves crop yield and therefore the income of the farmers, and how water quality improvements increase commercial fisheries catch and thereby incomes of fishermen.			Pattanayak & Kramer 2001
Revealed preferences	Travel Cost Method		E.g. part of the recreational value of a site is reflected in the amount of time and money that people spend while traveling to the site.	Whitten & Bennet 2002; Martin Lopez et al. 2009b
	Hedonic Pricing Method		For example: clean air, presence of water and aesthetic views will increase the price of surrounding real estate.	Bolitzer & Netusil 2000; Garrod & Willis 1991
Simulated valuation	Contingent Valuation Method (CVM)		It is often the only way to estimate non-use values. For example, a survey questionnaire might ask respondents to express their willingness to increase the level of water quality in a stream, lake or river so that they might enjoy activities like swimming, boating, or fishing.	Wilson & Carpenter 2000; Martin Lopez et al. 2007
	Choice modeling		It can be applied through different methods, which include choice experiments, contingent ranking, contingent rating and pair comparison.	Hanley & Wright 1998; Lii et al. 2004; Philip & MacMillan 2005
	Group valuation		It allows addressing shortcomings of revealed preference methods such as preference construction during the survey and lack of knowledge of respondents about what they are being asked to allocate values.	Wilson & Howarth 2002; Spash 2008

Source: (Arms worth, et al. 2010, cited by sitotaw, 2003)

C. **TRAVEL COST METHOD**

Recreation use value of a site to its users can be estimated by applying the travel cost method which originally proposed by Harold Hotel ling in 1949 (Ward and Beal, 2000). The travel cost method begins with the insight that the major cost of outdoor recreation is the travel and time costs incurred to get to the recreation site.

TCM was developed principally in papers by Clawson (1959), Knetsch (1963) and Clawson and Knetsch (1966) (Perman, 2003) when they tried to conduct scientific study and accept the outdoor recreation as the subject for social science analysis. They define recreation resources as *"land, water, or other natural features actually used for recreation."* Their study result showed that out-door recreation has many social, economic, educational (scientific study) and health (reduce the incidence of overweight and obesity) advantage.

The travel cost method (Bockstael et al, 1995) is a revealed preference method that is most often used to estimate the benefits of outdoor recreation (e.g., improved fishing opportunities following water quality improvement, Natural tourism sites, etc).

TCM has been widely used to evaluate the use-value (recreational use value) of natural assets located both in developed and developing countries and its main application in developing countries is to valuing international tourists' willingness to pay for visiting or assessing the benefits obtained by tourists visiting lakes and reserves (Dosi,2000).

The travel cost method is the rubric of recreation demand analysis. The number of trips to the site is assumed to be related to travel cost, time, and other demographic or location variables (Parsons, 2003).

The TCM attempts to estimate demand functions for non-market goods based on the notion of indirect costs. The method has been extensively used in the valuation of recreational sites (Seller, et al. 1985).

The demand functions are estimated by using travel costs as a surrogate for value. In defining indirect costs, several significant assumptions are made. First, it must be determined what are substitutable sites or activities. Second, a decision has to be made on an appropriate value of time to travel to the site. Third, decisions have to be made on how to allocate the value of a site between its ambience and its various other activities. There are also a number of data requirement problems related to this approach. Some economists conclude that the problems in specification and data collection with the TCM "result in the dispelling of what was once regarded as the TCM's greatest potential strength: appealing to the notion that visitor values must equal or exceed travel costs"(Cummings, et al., 1986).

The travel cost model determines site use by examining the time and travel expenses that people incur when visiting a recreation site.

The travel cost method seeks to place a value on recreational sites by using consumption behavior in related markets. In other words, this is a non-market procedure whereby a value for a recreation site is obtained by considering how much people are prepared to spend to reach the site. Specifically, the costs of consuming the recreational amenity of a particular site are used as a proxy for price; these costs can include travel costs, entry fees, on-site expenditures and outlay on capital equipment. The method assumes *weak complementarities* between the recreational/amenity service of the site and consumption expenditure/travel cost. This implies that when consumption expenditure falls to zero, the marginal utility of visitation is also zero, or alternately the recreational site will only be valued if consumption expenditure is positive (Hanley and Spash, 1993). It is often believed that the revealed preference methods(TCM) are more objective in their derived valuations than stated

preference approaches(CVM), because the stated preference approaches depends on subjective responses by respondents, hence, it is widely believed that the TCM are necessary scientifically more empirical than the CVM and free from subjective influences.

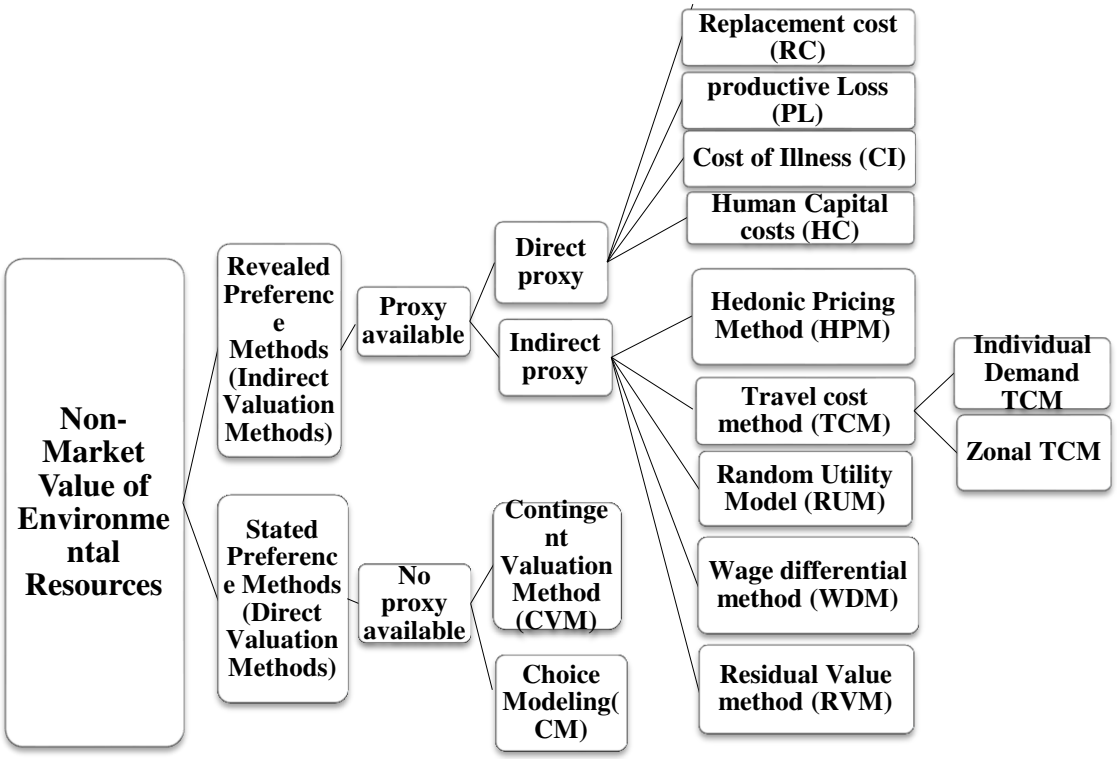


Figure: 2.2 Environmental Resources Valuation Techniques

(Adapted from Pearce et al. (2006); cited by Atalel W. 2012.

2.1.4 Microeconomic Concept Application

2.1.4.1 Concept of Derivation of Demand from Consumption theory

Nillesen (2002) a representative consumer has been considered who consumes a marketable good and an environmental good, namely visits to a lake. The consumer maximizes utility subject to a budget constraint. The budget is constrained by the income the consumer earns, represented by the multiplication of a wage rate and the hours of paid work. The algebraic form[1] is:

$$\boldsymbol{Max}: \boldsymbol{U}\ (\boldsymbol{X}, \boldsymbol{V})\ \ldots\ \ldots\ \ldots\ \ldots\ \ldots\ \ldots\ (\mathbf{1})$$

$$\boldsymbol{X}, \boldsymbol{V}$$

$$\boldsymbol{subject\ to}: \boldsymbol{wL}\ =\ \boldsymbol{Px}\ \boldsymbol{X} +\ \boldsymbol{po}\ \boldsymbol{V}\ \ldots\ \ldots\ \ldots\ \ldots\ \ldots\ (\mathbf{2})$$

Where: U = Utility, X = The market good, V = Visits to the park, W = Hourly wage rate, L = Hours of wage labor, Px = Price of market good x, Po = Out-of-pocket expenses for a visit to the lake. However, out-of-pocket expenses are not the only cost of visiting the lake.

Consumers must take time to travel to the park, time, which alternatively could have been devoted to some other activity. Time has an opportunity cost. The assumption therefore has been made that the consumer faces a utility maximization problem subject to a time budget constraint. The consumer is supposed to devote all his time on either working or visiting nature based recreational site. The time constraint has the following form:

$$\boldsymbol{T}\ =\ \boldsymbol{L}\ +\ \boldsymbol{HV}\ \ldots\ \ldots\ \ldots\ \ldots\ \ldots\ \ldots (\mathbf{3})$$

Where: T = Total household time available, H = Time associated with a single round-trip to the lake including time spent on-site, L = Hours of wage labor.

The maximization problem then takes the following form:

$$\boldsymbol{Max}: \boldsymbol{Max}: \boldsymbol{U}\ (\boldsymbol{x}, \boldsymbol{v})\ \ldots\ \ldots\ \ldots\ \ldots\ \ldots\ \ldots\ (\mathbf{4})$$

$$\boldsymbol{x}, \boldsymbol{v}$$

$$\boldsymbol{subject\ to}: \boldsymbol{WT}\ =\ \boldsymbol{Px}\ \boldsymbol{X}\ +\ [\ \boldsymbol{Po}\ +\ \boldsymbol{WH}\ ]\boldsymbol{V}\ =\ \boldsymbol{Px}\ \boldsymbol{X}\ +\ \boldsymbol{Po}\ \boldsymbol{V}\ \ldots\ \ldots\ (\mathbf{5})$$

The price of a visit to the park is thus not only the aforementioned out-of pocket expenses, but also the income foregone by choosing to visit the lake instead of working. Furthermore, the consumer now maximizes utility, subject not only to the hours of paid work, but to the total household time available. This is termed the 'full income concept'

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1 : For detail, Nillesen, E. (2002),Thesis, School of Economics, University of Queensland, Australia.

The Lagrange expression is:

$$L = U(X, V) + \lambda (WT - Px\,X + Pv\,V) \ldots\ldots\ldots\ldots (6)$$

The necessary first order conditions (FOC) are:

$$\delta L/\delta x = \delta U/\delta x - \lambda\, px = 0 \ \ldots\ldots\ldots\ldots\ldots (6a)$$

$$\delta L/\delta v = \delta U/\delta v - \lambda\, pv = 0 \ \ldots\ldots\ldots\ldots\ldots (6b)$$

$$\delta L/\delta\, \lambda = wT - px\, x + pv\, v = 0 \ \ldots\ldots\ldots\ldots (6c)$$

These three equations can be rewritten as:

$$\delta U/\delta x = \lambda\, px \ \ldots\ldots\ldots\ldots\ldots\ldots (6a)$$

$$\delta U/\delta v = \lambda\, pv \ \ldots\ldots\ldots\ldots\ldots\ldots (6b)$$

$$wT = px\, x + pv\, v \ \ldots\ldots\ldots\ldots\ldots\ldots (6b)$$

In other word, the recreational demand can be equated as $V = \frac{wT - px\,x}{pv}$

Solving these problems will yield the following ordinary Marshillian demand function for visits to the lake:

$$v = F(pv, px, Y, Z) \ \ldots\ldots\ldots\ldots\ldots\ldots (7)$$

Thus, the consumer demand for a visit to the lake depends on the price for a visit (pv), the price for other goods (substitute sites) (Px), the income of the visitor/household(Y), and other socio-economic variables (Z).

When a demand function has been derived, a next step is to construct a demand curve. The demand curve can be derived by holding income and prices of substitutes constant and vary the price of the commodity (travel cost of a single round-trip to a lake), which generates number of trips to the lake at different travel cost. Once a demand curve has been constructed, the total value of the lake can be computed, referred to as consumer surplus. Consumer surplus plus travel cost equals total recreational value of the lake.

2.1.4.2 Calculation of visitation rate using TCM

The basic assumptions for application of the TCM are[2]:

a) Weak complementary theory- joint consumption of the amenity service of recreational site (E) and consumption expenditure(C). This implies that when consumption expenditure falls to zero, the marginal utility of visitation is also zero, or alternately the recreational site will only be valued if consumption expenditure is positive. (Hanley and Spash, 1993).

b) Visitation rate to the recreational sites are determined by a trip- or visit-generating function.

$$V_i = F(C_i, X_{1i}, X_{2i} \ldots X_{ni}) \ldots\ldots (9)$$

Where V_i= visitation rate, Ci= travel cost, X= other socio-economic & demographic variables.

c) Cost of a visit comprises both travel costs *Ti*, varying with *i*, and admission price, *P*, constant across *i*, and so that ($\mathbf{C_i = T_i + P_i}$). i.e. Visitors treat travel costs and the price of admission as equivalent elements of the total cost of a visit. If we suppose that trip- or visit-generating function is linear;

$$\boldsymbol{Vi = \alpha + \beta Ci + \varepsilon i = \alpha + \beta(\mathrm{Ti} + \mathrm{Pi}) + \varepsilon i} \ldots\ldots (10)$$

Where, εi =stochatic error

$\frac{\partial Vi}{\partial Ci} =< 0$ This means the trip or visitation generation function is down ward sloping or has negative slope or in other words the visitors demand are directly sensitive to the change in the total cost of visitation. I.e. a lower relative frequency of visits would be expected from residents living more distant from the natural attraction than those closer by, given that the demand for visits is a normal economic good. Because, those travelling greater distances to visit the natural area will usually incur greater travel

2 : further reference ,R. perman (2003), 3rd edition, pp.411-413

cost. Therefore, the effective price or cost of a visit is higher than for those who live closer to the natural area. The mean of visitation rate will become; $[\boldsymbol{Vi}] = \boldsymbol{\alpha} + \boldsymbol{\beta Ti} + \boldsymbol{\beta Pi}$because by assumption the mean of error term become zero ([εi] =0)

$[\boldsymbol{Vi}] = \boldsymbol{\alpha} + \boldsymbol{\beta Ti} + \boldsymbol{\beta Pi}$; The [Vi] = 0; we can determine the value of choke price, p*. $p* = -\frac{\alpha}{\beta} - Ti$ ……(11)

and when P become zero ; $[\boldsymbol{Vi}] = \boldsymbol{\alpha} + \boldsymbol{\beta Ti}$

Trip –generation function is the basis for estimating the demand curve for visits to the natural site and subsequently for measuring the economic surplus derived by visitors or tourists from their visits to the site (Tisdell, 1992,).

The Marshallian measure of consumers' surplus (Marshillian demand) is used to derive the economic value that visitors obtain from their visit to the natural site. If entry to the site is free, this surplus is equivalent to the area under the demand curve for visits. It is the difference between the maximum amount that visitors pay to enter the natural site and the maximum amount they would be prepared to pay for entry.

In applications of the TCM, surplus for $P = 0$ is calculated across i using the actual observed visits for each origin/individual, as in

$$\text{MCSi} = -\frac{\Sigma \boldsymbol{i}[\boldsymbol{Vi}]^{\mathbf{2}}}{\mathbf{2}\boldsymbol{\beta}} \quad \text{.....(12)}$$

Following Bateman (1993) the demand function estimated by the TCM is an uncompensated ordinary demand (Marshillian demand) curve incorporating income effects and the welfare measure obtained from it will be that of Marshallian consumer surplus.

The TCM evaluates the recreational use value for a specific recreation site by relating demand for that site (measured as site visits) to its price (measured as the costs of a visit).

A simple TCM model can be defined by a 'trip-generation function' (*tgf*) such as;

$$V = f(C, X).$$ ..... (13)

Where, V = visits to a site

C = visit costs

X = other socioeconomic variables which significantly explain V.

According to the particular definition of the dependent variable V, many literatures on TCM classify TCM into two basic variants of this model[3].

The first 'Individual Travel Cost Method' (ITCM) simply defines the dependent variable as the number of site visits made by each visitor over a specific period, say one year. The second 'Zonal Travel Cost Method' (ZTCM) on the other hand, partitions the entire area from which visitors originate into a set of visitor zones and then defines the dependent variable as the visitor rate (i.e., the number of visits made from a particular zone in a period divided by the population of that zone).

The ZTCM approach redefines the trip generating function (*tgf*) as;

$V_{hj}/N = f(C_h, X_h)$ ..... (14)

Where, V = visits to a site

C = visit costs

X = other socioeconomic variables which significantly explain V.

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the visitor rate (i.e., the number of visits made from a particular zone in a period divided by the population of that zone).

The ZTCM approach redefines the trip generating function (*tgf*) as;

$$V_{hj}/N = f(C_h, X_h) \quad \text{..... (15)}$$

Where, *Vhj* = Visits from zone *h* to site *j* *Nhj* = Population of zone *h*

C_h = Visit costs from zone *h* to site *j*

X_h = Socioeconomic explanatory variables in zone *h*

The visitor rate, *Vhj/Nhj*, is often calculated as visits per 1,000 populations in zone *hj*.

1. Individual travel cost (ITC) model

The individual travel cost model which accounts for estimating individuals recreation demand functions. This is done by observing the visitation rate of individuals who make trips to a recreational facility as a function of the travel cost. The value of a recreation site to an individual is the area under each demand curve summed over all individuals. This model requires that there is a variation in the number of trips individuals make to the recreational site, in order to estimate the demand function. The variation is not always perceived as all individuals do not always make a positive number of trips to a recreational site.

The individual travel cost models are preferred over the zonal travel cost model. The zonal travel cost model is statistically inefficient since it aggregates data from a large number of individual observations into a few zonal observations (Georgiou *et al.*, 1997).Moreover all individuals from within a zone are considered to have same travel costs in the zonal model.

We can specify the individual travel cost model as:

$$Vij = f(Cij, Xij \ldots\ldots Xnj) \quad \text{.....(16)}$$

Where, V_{ij} = Number of visits made per year by individual i to site j

Cij = individual's total visit cost of visiting site j

Xnj = individual socio-economic variables

Integrating under this curve gives us our ITCM estimate of consumer surplus per individual. Consumer surplus for the site is then obtained by multiplying the individual consumer surplus with the number of individuals visiting the site annually.

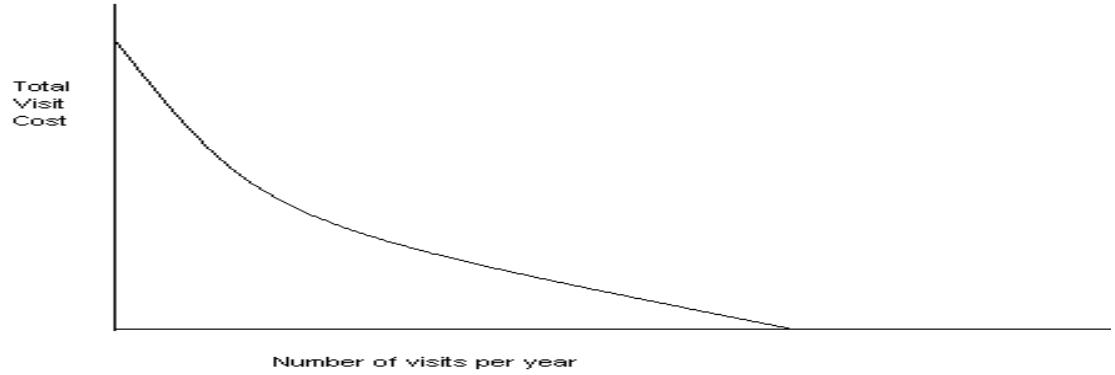


Figure: 2.3 Individual travel cost model – Illustrative demand curve

Individual travel cost method (ITCM), where the dependent variable is the number of trips per year (or per season) by individual users of a recreation site and is more appropriate for local, frequently visited, sites. ITCM avoids arbitrary zone definitions required in the ZTCM.

2.1.5 Calculation of the Value of Consumer Surplus

According to Burhan .ZKAN, et al, (2002) the estimation of the individual consumer surplus (ICS) will be by use the following formula,

$$ICSi = -\frac{Vi}{\beta i} \quad \text{.....(17)}$$

Where**,** CS: Consumer surplus,

Vi: Average of the total annual number of visits,

$\boldsymbol{\beta}$: Curve of the demand function (cost coefficient).

Total consumer surplus (TCS) is calculated as by multiplication of the total number of visitors (N) with total individual consumer surplus (ICS);

TCS= N*ICS …….(18)

Where, N = total number of visitors

ICS = individual consumer surplus

The ITCM is better suited to provide inferences about individual consumer behavior. As a result, the ITCM gains better statistical efficiency than the ZTCM (Bowker and Leeworthy, 1998).

The individual travel cost approach and the zonal approach, uses different data source entity, ITCM use survey data from individual visitors, where ZTCM use data from each zone for the statistical analysis. The Individual Travel Cost Method uses survey data collected from visitors on their number of visits, travel costs and socio-economic characteristics.

The study employed the ITCM because the on-site respondents do not come from the same zones or regions.

2. Zonal travel cost model

The Zonal travel cost model was first applied and developed by Clawson at Resources for the First in the late 1950s and 1960s. The data needed includes a sample of visitors to the site in question, identifying their origin. Having identified the origin of visitors, it is possible to estimate the number of visitors per year from each origin "zone". Knowing the population of each origin zone gives a visitation rate for the zone. This visitation rate is explained by two factors: the travel cost from the origin to the site and the demographic/income characteristics of the population of the origin zone to the site.

The zonal travel cost method (ZTCM), where the dependent variable is the number of trips taken to the site by the population from different regions or zones.

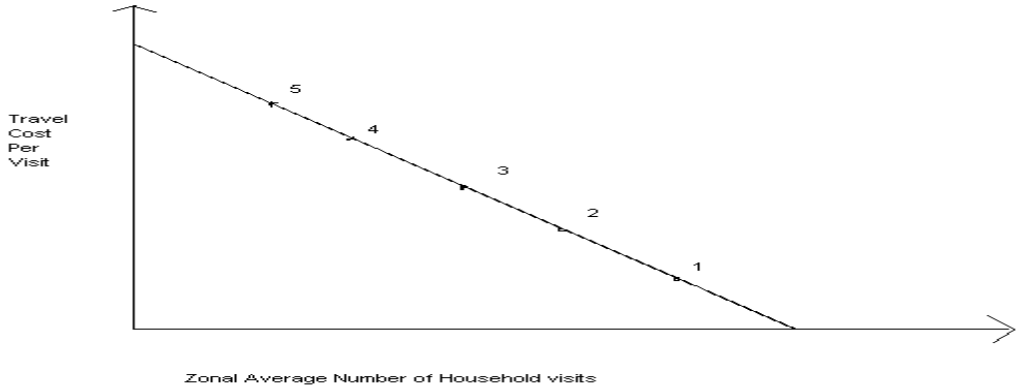


Figure: 2.4: **Zonal travel cost model – Illustrative demand curve**

The TCM enables one to calculate an individual's Consumer Surplus (CS) by integrating under the demand curve, whereas CV directly uncovers an individual's WTP. TCM mostly takes into account direct use values of component total economic value (TEV) of the environmental amenity. Use values comprise the utility obtained from direct interaction with the recreational site. When the travel cost model is applied to recreation demand it is assumed that there will be a negative relationship between the costs of trips and the number of trips taken, and consequently it is assumed that the demand curve will have a negative slope.

The consumer surplus from the TCM can be directly compared with the willingness-to-pay obtained from the contingent valuation. Alternatively, the WTP measures found by contingent valuation imply a slope of the demand curve that can be compared with the estimated slope from the TCM. If the two valuation methods are consistent there should be a correlation between WTP estimates and TC estimates for individual respondents. (Mayor, et al. 2007)

Traditionally, TCM studies have used one equation to model the number of trips people take to a specific recreation site (***'single-site models'***), and have assumed that the number of trips is a function of travel costs, and that the travel cost is proportional to distance from the site. Moreover, a single-purpose trip has been frequently assumed. All these assumptions are

"often valid in the case of [tourism within a country but] may not be valid for international tourism" (World Bank, 1998).

Travel cost method or TCM is an indirect method used for estimating user benefits from visits to recreational sites (such as beaches, parks and heritage site) (Liston-Heyes and Heyes, 1999). By using this method, the expenditure related to recreation travel would be treated as travel costs as an accounting an aggregation of out of pocket costs associated with distance traveled and value of time spent traveling (Englin and Shonkwiler,1995).

As well as this expenditure incurred in getting to the site would be as a surrogate for the "price" paid by that visitor for that site's use. This allows for the estimation of a demand function as well as the estimation of consumer surplus of recreation sites and activities by calculating the area below the demand function and above the implicit price (Freeman, 1993).

2.1.6 Some Challenges with the Travel Cost Method

In practical application, there are a number of complexities with using the travel cost method[5]. These were categorized into three: Treatment of time; the treatment of multiple-site visitors; and the treatment of overseas visitors.

A. Treatment of time

This problem is the natural problem. Because, in the very earliest applications of the travel cost method (Cesario and Knetsch, 1970; Cesario, 1976) the treatment of the cost of time, both travel time and time spent on-site, has been problematic.

The rational, for inclusion of time costs within the travel cost framework is that, as a scarce commodity, the opportunity cost of time must be included and that failure to do so will increase the price elasticity of demand and therefore reduce the estimated benefits of visiting the recreation site (Freeman, 1993).

5 Further reference: Freeman (1993).

Building upon the framework of Becker (1965) and following the work of Cesario (1976), who drew on evidence from the transportation literature, many studies assume that time can be valued at a fraction (usually between ¼ and ½) of the wage rate. There are, however, numerous difficulties with this approach. First, and perhaps most critically, it assumes that individuals are able to continuously trade-off time spent at work, with time spent in leisure. While this may be the case for some (the self employed, for example) for most, including those who have fixed working hours or who are outside the labor force, this assumption is untenable (Bockstael *et al.*, 1987).

In one of the few empirical tests of this assumption, McKean *et al.* (1995) conclude:

> …opportunity time values can differ markedly between those able to substitute time for income and those who cannot. Models which ignore institutional constraints on time allocation thus may misstate opportunity time costs and consumer surplus. (McKean *et al.*, 1995)

In a further criticism, Shaw (1992) argues that distinction needs to be made between the value (net benefit) of time spent in an activity and the opportunity cost (the net benefit of time spent in the next best alternative activity). Shaw notes that, for example, low income earners may have a low opportunity cost of time, not necessarily a low value of time. Moreover, it seems implausible that the opportunity cost is time spent in paid employment; it is more likely that this time would be spent pursuing alternative leisure activities. That is, the opportunity cost of leisure is seldom wages (or other benefits of work) that are foregone, as in most cases work hours are fixed and people use weekends and paid holidays for vacations and recreation trips.

Other difficulties with using the wage rate as a measure of the value of time, include the implicit assumption that time spent at work is neither liked nor disliked (Lew and Larson, 2005), and the fact that surveys often provide data on household income rather than the

hourly wage rate; inferring wage rates by dividing household income by some estimate of hours worked will introduce measurement error (Freeman, 1993).

In all, in evaluating the validity of this approach, (Smith *et al.* (1983) conclude:

…simple approximations, such as treating the opportunity cost as a fixed multiple of an individual's wage rate, are not likely to resolve the problems associated with defining a measure of these costs that is both theoretically consistent and practically feasible with existing data sources. (Smith *et al.*, 1983 p.259).

With specific regard to on-site time, McConnell (1992) notes that its inclusion is problematic, as spending more time at a site should enhance the value of the visit, while simultaneously increasing the (time) cost. This dual-role as a determinant of cost and quality creates a problem for travel cost demand estimation and many researchers advocate its exclusion (Ward and Beal, 2000). Time spent on-site may be considered exogenously determined and the marginal utility derived equals that from other activities.

Whitten and Bennett (2002), for example, therefore treat it as having no impact on consumer surplus and hence do not include it. In response to these criticisms, researchers have developed a range of alternative approaches including the use of a labor supply model (Feather and Shaw, 1999) and the use of stated preference data (Shaw, 1992; Casey *et al.*, 1995; Alvarez-Farizo *et al.*, 2001; Larson *et al.*, 2004). Although the latter approach shows promise, difficulties remain, including the increased cognitive burden associated with adding stated preference questions to travel cost surveys. In all there is a strong case for not including time costs at all and this is the approach taken here. This is consistent with that of a number of other practitioners including Siderelis and Moore (1995), the aforementioned Whitten and Bennett (2002) and Prayaga *et al.*(2006).Moreover, the decision to exclude time costs is supported by Beal (1995a), who in a study seeking to elicit the opportunity cost of travel time for visitors to Girraween and Carnarvon Gorge Lakes in Australia, finds: The

evidence…supports the hypothesis that recreation travel to camping sites has no monetary opportunity cost for the majority of visitors…it would be inappropriate for researchers estimating travel costs to include time costs in their valuations. The inclusion of a researcher-estimated value for travel time will serve to make the estimated demand function more price inelastic than it really is. (Beal, 1995a p.13)

B. Treatment of multiple-site visitors

One of the major assumptions of the travel cost methodology is that only one site is visited per trip. In other words, all the travel costs are incurred exclusively to obtain access to the particular recreation site being valued (Haspel and Johnson, 1982). When the site is remote but unique, some visitors would be from far distances and so the visit for them would be one of a group of activities and other destinations. When travel costs are shared inseparably between more than one site, there exists the problem of joint consumption benefits (Clough and Meister, 1991). If a trip has multiple objectives, it implies the full cost of the trip is not an implicit price for the particular recreation site under consideration. Allocating the full costs would overestimate the visitation rate and the recreation value (Kerr *et al.*, 1986).

On the other hand, if all visitors are included and the total travel costs for visiting multiple sites are adjusted and only part thereof applied to a single-site, the basis of the travel cost procedure may be undermined (Beal, 1995).

The travel cost methodology relies on the tenet that demand falls as prices rise. The correlation between demand and prices disappears when only a fraction of the total costs are used. One solution is to exclude multiple-site visitors from the sample.

C. Treatment of overseas visitors

The treatment of overseas visitors can vary. One option is to take their costs of travel from their temporary residence. Prayaga *et al.* (2006) did this, treating all overseas visitors (to the

Gemfest event in central Queensland) as coming from the local region. A second option is to treat the various countries-of-origin of international visitors as zones.

All the travel spending of overseas visitors does not occur in our country, which indicates that it does not contribute to consumer surplus. Another option is to omit all overseas visitors from the sample. Accordingly, in this paper, overseas visitors are excluded from the analysis.

Even though all methods or models of the environmental valuations are not free from criticism; there is a good potential and have useful properties of each methods that aid researchers in their assessment of non-market values. The travel cost model determines site use by examining the time and travel expenses that people incur when visiting a recreation site. It is then assumed that these costs represent the 'price' of accessing the site for each individual user. The Individual Travel Cost Method uses survey data collected from visitors on their number of visits, travel costs and socio-economic characteristics.

Two models are traditionally used to analysis TCM data − the Poisson model and the Negative Binomial (NB) model. The use of the latter allows testing for over-dispersion, an option not available when using the Poisson model. The use of the Negative Binomial will generate a function called a *'trip generating function'*, which can be used to estimate a demand curve for the typical visitor to the site. The consumer surplus can then be inferred by integrating under the demand curve and estimating the area above the price line. (Mayor, et al., 2007)

With this in mind, the researcher used Poisson distribution for analysis of the count nature of the TCM data.

The individuals perceive the value of public parks in different way due to their personal characteristics, such as age, income, education and past experience of using public park service and the different attractiveness and accessibility of park also result in different value of park benefits from different patterns of public park utilization. Therefore, the different

value on different park can be very useful information to guide local planning agency to locate suitable plan for current and future policy for public park service improvement and to enhance the quality of life of the community. (Hokao, et al. 2005)

All methods of Environmental Resource Valuations have their own advantage and disadvantage. But, to determine one method the relative advantage of one method to others the value must be greater than its own disadvantage.

Table: 2.3: Comparison of TCM and CVM.

TCM	Advantage	Disadvantage
The TCM-approach derives willingness to pay for environmental benefits at a specific location by using information on the amount of money and time that people spend to visit the location.	1. Widely used to estimate the value of recreational sites including public parks and wildlife service's in developed countries. 2. It could be used to estimate willingness to pay for eco-tourism to tropical wetlands or lakes in some developing countries. 3. More applicable to estimate the use value of environmental assets. 4. Data employed are reliable.	-Data intensive; restrictive assumptions about consumer behavior (e.g. multifunctional trips); results highly sensitive to statistical methods used to specify the demand relation-ship. - Difficulty to calculate opportunity cost of time.
CVM- derives the willingness to pay for environmental benefits at a specific location by using of hypothetical markets	a. Also applicable both in developed and developing countries for estimation of the willingness to pay. b. Simple and easy compared to others c. More applicable to estimate the non-use value of environmental assets.	i. Data employed are not reliable. ii.Not use real market information

Source: Own computation (2014)

The researcher wants to use the TCM for the estimation of the recreational total use value of the sites. The general concept of the model is total economic value (TEV), which is the sum of total use value and total non-use value. ***TEV=TUV+TNUV***, whereas,

TUV=total use value, TNUV= total non-use value.

Total Non-use value =Bequest value +Existence value.

The study focuses only on the measure of economic use value of the Babogayya Lake. Because TCM is limited to measure the recreation benefits (use value) provided by a natural resource. The benefits estimated from TCM do not include any non-use value (option value

plus existence values) (Randall and Stoll). For many types of commonly available recreation sites, this omission of off-site user benefits is probably not significant.

In short, the TCM is based on real expenses that are more reliable than other methods. So, it can be considered a "more accurate prediction" of use values than the CVM.

Because the CVM is more depends on *"hypothetical markets which is more abstract and ideal"*. Additionally, a technique (CVM) designed to estimate non-use values cannot use real market information. Based on these facts the researcher employed the TCM for valuation of total economic use value of the site.

2.2 Empirical Related Literature Review

2.2.1 Applications of TCM in developed countries

Mendes et al. (2002) used TCM to estimate the recreational benefits of Penda-Geres Lake in Portugal. Though 1000 questionnaires were distributed, only 243 were filled out and this sample size was used to derive the demand curve for the park. The questionnaire was composed of three blocks of subjects: Socio-economic characteristics, the nature of the trip to the park and the visitors' available income. In this study, Mendes attempted to measure the benefit of the Peneda-Geres Lake's visitor per each day of using the natural resource. In this case, the benefit of the park's visitor per each day of using the natural resources was defined as being the relevant area under the parks Marshalian recreation demand curve. The Recreation Produced in the Park by the i^{th} visitor was measured in days of recreation per average visit with the price of a recreation day in the park. This price was assumed to be equal to travel costs and on stay costs, per each day of visit. The study obtained that the average number of onsite days per each sample visitor was 5.284; and it showed that a medium length recreation visit to the park generated a surplus from Euro 250.65 to Euro 274.08 depending on the type of opportunity recreation time cost one considered (i.e. when

the opportunity cost of recreation time was considered to be 33% or 50% of the visitor's real per capita recreation income.)

Taylor (2000) carried out a research using TCM to measure the economic value of outdoor recreation site "Snake River Basin of Central Idaho" in Moscow. In this study, mail surveys were used and 190 completely important responses were considered as a sample to derive the linear demand curve for the TCM. The TCM survey was designed to include money and time costs of on-site time, on site purchases, the money and time costs of other activities on the trip.

Bockstael et al. (1987) and Mc Connell and Strand (1981) attempted to estimate the travel Cost using different models. An important distinction between these two models is that in the McConnell and Strand Model, the equilibrium labor market requires that out-of-pocket and opportunity time value costs be added together to force an identical coefficient on both costs. In Bockstael et al. model, however, the disequilibrium labor market model requires separate coefficients to be estimated for out-of-pocket costs and opportunity time value or Costs. Although the equilibrium labor market model requires that the marginal effects of out-of-pocket cost and income forgone on quantity demanded are equal. Empirical results often fail to support the model if the two components of price are entered separately in a regression. Measurement and statistical problems often beset the full price variable in empirical applications, i.e., simple income questions are unlikely to elicit true marginal opportunity time cost. In practice, marginal income specified by theory is usually replaced by a more easily observable measure consisting of average family income per unit time though marginal and average values of income are, unfortunately, unlikely to be the same.

Therefore, Taylor considered Bockstael travel cost model and employed truncated negative binomial regression for appropriate demand curve estimation. Essentially, truncated Poisson or truncated negative binomial regression is appropriate for dependent variables with count

data (integer). Taylor applied the truncated negative binomial regression and he found that consumer surplus per recreationist per trip was USD 87.24 .The average recreationist trips per year in the sample was 2.76. Then, the total surplus per recreationist per year was USD 241 per year.

Hackett (2000) carried out a research using TCM to estimate the recreational economic value of the Eastern Trinity Alps Wilderness in North Western California. A data set of 69 observations from 69 country zones of origin on 4473 individual visitors to the Trinity Alps Wilderness was used to estimate the resource demand curve. In this study, ZTCM was used to estimate the resource demand curve. In statistical analysis, two-stage process was employed. Hacket estimated that an individual visitor to the Trinity Alps Wilderness spent an average of USD75.93; and the statistical analysis estimated an average of USD29.38 in net benefits or consumer surplus from each individual's wilderness recreational experience or a total of USD 131,417 in net benefits (consumer surplus) from visitors' wilderness recreational experience.

2.2.2 Application of TCM in Valuing Outdoor Recreation Sites in Ethiopia

After 1980s small studies have been started in the area of environmental valuations of different natural and artificial recreational sites in Ethiopia.

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**.** He estimated linear demand curve by application of the TCM. The result showed that the total annual on site recreational benefit was estimated to be Birr 9,842,094.80 which is higher than what the authority of the site collected, which is not more than 100,000 birr.

Terefe et al. (2000) examined the economic value of Tis-Abay Water Falls using TCM. In their efforts to measure the value of outdoor recreation for this site and then, TCM was

estimated using semi-log independent functional form. The result showed that the optimal gate fee is set to Birr 40.

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

Melaku et al. (2007) has applied TCM to estimate the economic value of an ecotourism area taking Bishangari Lodge as a case study using Poisson regression model. The aggregate on-site recreational benefit per visit amounted to birr 820. The total annual benefit of the site was estimated to be birr 3,943,500. However, the site authorities collected only about 25% of the true recreational benefit of the site for the survey 12 months, showing that the site is not used efficiently.

Mesfin (2010), conducted a research on the recreational benefit of Wondo Genet recreational site using Individual TCM. The result showed that the average recreational benefit per annum is estimated to be Birr 7,899,301.

Fisseha (1997) on household willingness to pay for improved water supply service on Meki town used contingent valuation method. According to the estimation, the rural households are willing to pay five times higher than the actual price collected per insera.

By using the contingent valuation method two similar studies were conducted by Yalemzewd (2007) and Solomon (2007) on the valuation of urban green spaces and valuation of urban forests, respectively. The result from these two studies confirms household‘s positive willingness to pay for urban green environment policies.

Before this study, there is no study conducted on recreational sites of Bishoftu town in relation to environmental valuations. Hence, the study is rational to be undertaken where there is no study before.

For this study, the travel cost method was employed to estimate the economic use value of a recreational benefit of Bishoftu town recreational site (Babogayya Lake) as a case study by application of the alternative of the individual travel cost method.

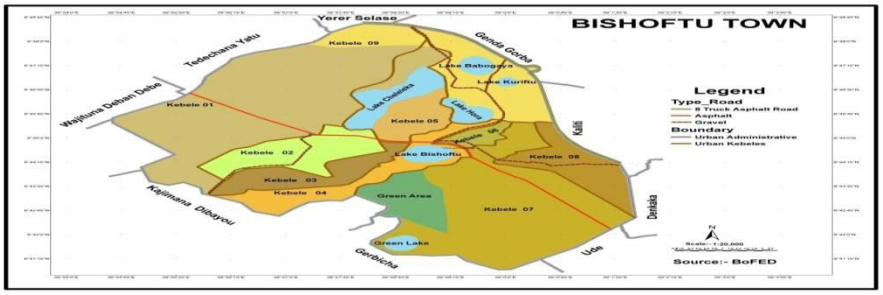
CHAPTER THREE

3.1 Research Methodology and Data Sources

In order to fully meet the objectives of the study by collecting sufficient data from different sources the researcher employed both secondary data and primary data. Even though there is shortage of sufficient data from secondary data source, the researcher tried to employ large sample size for primary data collection and small Secondary data.

3.2 Study site description

Bishoftu town is one of the oldest town and currently becoming one of the known tourist destination town in Oromia regional state and Ethiopia as well. It is located in the Eastern Shewa Zone of the Oromia Regional State, and has an elevation of 1,920 meters (6,300 ft). It is located 47.9 kilometers



(29.8 mi) at South East of Finfine or Addis Ababa along its route four high ways and capital town of Adea district/woreda. It has had telephone service since 1954.The town has nine kebeles, and an estimated total population of more than 136, 000 (66,677 male and 69,395 female), was founded in 1917 when the Ethio-Djibouti Railway was established. The term Bishoftu is derived from the Afan Oromo language *"Bishaanoftuu"* which refers to *"the land of excess to water body from Natural crater lakes"*. The town blessed with magnificent natural beauty and located relatively close to the capital city, Addis Ababa and is known for its Seven(7) crater lakes such as Lake of Bishoftu, Lake of Hora Harsadi, Lake of Cheleleka, Lake of Kuriftu, Lake of Kilole, Lake of Megerisa(Green) and Lake of Babogayya(Lake of Bishoftu Guddo). Hence, Bishoftu is usually recalled as ***"City of Lakes."***



Sample of lakes of City of lake (Bishoftu town)

3.3 Primary data sources & Collection methods

3.3.1 Population of study

Population of the study includes all the on-site visitors (both Ethiopian and foreigners who live in Ethiopia) who go to Babogayya Lake with sole visiting purpose.

3.3.2 Sampling method and Sampling size determination

For the requirement of adequate, representative and appropriates sample size and sampling methods, visitors (both foreign and non-foreign) which purposely went to visit(Babogayya lake) recreational site of Bishoftu town were taken to be the sampling population.

From different literature sources, many researchers(like Melaku (2007) used 173 Sample size from BishaanGaarii lodge, Mahmmud (1998) used 223 respondents from Sodare recreational sites , Amer and Said (2006) used 283 sample for Dibeen Lake).In Environmental valuation which employee either of CVM or TCM researchers usually use sample sizes of at least 173. Additionally, though sampling and sample size are crucial issues in pieces of quantitative research, due to lack of adequate time and budget the researcher limited the sample size to 230 respondents randomly selected on site; but only 173 questionnaires were completed correctly. The questionnaires were randomly distributed to all available visitors at that time on site at all recreational sites with consideration of the interest of person to fill the

questionnaire, age (children are purposely excluded), and etc. Foreign visitors were not available at the time of survey and were not included in the sample.

3.3.3 Primary Data Collection Instruments

In order to acquire more accurate, reliable and relevant data or information the researcher approaches to the respondents through patience, respecting, polite way, good, smooth communication by having a discussion, interpretation question and answering on the unclear points on the questionnaire. The primary data source was collected in the form of administrative questionnaire and face to face interview from on site visitors (for illiterate). Face-to-face interviews or personal interviews were prepared for managers of the recreational sites and conducted accordingly to get number of visitors came per month and their monthly revenue. In order to minimize the defects of questionnaires of data collection techniques both open ended and closed ended questionnaires were used.

3.4 Specification of Count Data Regression model

The central characteristics of a count-dependent-variable are: i. It must be a positive integer, including zero; ii. It has not an obvious maximum or upper limit; iii. Most of the values must be low, and particularly there must be lots of zeros.(Ricardo Nicolás et al.,2008).

Regression models for count data, like other limited or discrete dependent variable models such as the logit and probit, are nonlinear with many properties and special features intimately connected to discreteness and nonlinearity.

Count data regression model has applications in different fields of the study.For instance, Recreational demand studies seek to place a value on natural resourcessuch as national forests by modeling the number of trips to a recreational site (Gurmu and Trivedi, 1996).

Health demand studies model data on the number of times that individuals consume a health service, such as visits to a doctor or days in the hospital in the past year (Cameron et al., 1988).

For count data, linear models (OLS) have shortcomings very similar to those for binary responses or corner solution responses, because the dependent variable always should be nonnegative for all independent variables. Hence, the MLE is more appropriate.

There are two types of the count data models.

3.4.1 Poisson regression model

Assumptions in Poisson Regression

The assumptions include:

a. At each level of the covariates the number of cases has variance equal to the mean.
b. Observations are independent.

It is derived from Poisson distribution function.

$$\left(f\left(y|\mu, y \geq 1\right) = \frac{e^{-\mu}\mu^{y}}{y!} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (19)\right.$$

For simplification, the Poisson regression model is expressed in semi-log function. Then, the coefficients are semi-elasticity and will be interpreted as the proportional changes & guarantees $E(y \mid x) > 0$ and provides a simple interpretation for the Marginal effects:

$$\ln \mathbf{E(Y|X)} = \frac{\partial E(y \mid x)}{\partial x k} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (20)$$

By using maximum likelihood estimation of Poisson model with right specification the estimator is consistent, asymptotically, normal and efficient.

Weakness of Poisson regression model

By contrast the normal distribution Poisson regression model has separate parameters for location (μ) and scale (σ^2).

I. **Over dispersion:** occur when the variance (σ^2) is greater than mean (μ). This caused by a presence of a more basic misspecification, (especially in data settings that involve truncation and censoring) if they are ignored in estimation, unobserved heterogeneity, failure of the assumption of independence of events. Over dispersion have consequences to the failure of the assumption of homoskedasticity and inconsistency.

Over-dispersion is a form of heteroskedasticity. There is over-dispersion when the conditional variance is greater than the conditional mean, which is true for many datasets. The negative binomial count data model corrects for over-dispersion. If the Poisson model would be used in the presence of over-dispersion, the mean would still be consistently estimated but the standard errors of the estimated coefficients would be biased downwards. (Cameron and Trivedi, 1998).

3.4.2 Negative Binomial Model

The Poisson distribution is a particular case of the Negative Binomial distribution. Equivalently, the Poisson Regression Model is a particular case of the Negative Binomial Regression Model. In the negative binomial (maximum-likelihood) regression model the count variable is believed to be generated by a Poisson-like process, except that the variation is greater than that of a true Poisson. This extra variation is referred to as over-dispersion. If a Poisson regression model doesn't fit the data and it appears that the variance of *dependent variable is* increasing faster than the Poisson model allows, so that the more formal way to accommodate over-dispersion in a count data regression model is to use a negative binomial model.

$$\mathbf{P(y), y \geq 0)} = \frac{\Gamma(Y+\alpha)}{\Gamma(\alpha)y!}\left(\frac{\beta}{1+\beta}\right)^{y}\left(\frac{1}{1+\beta}\right)^{\alpha} \quad \text{.....(21)}$$

where y= visitation rate and alpha= variance

$$\text{Mean} = \quad E(Y) = \alpha\beta \quad \& \text{ Variance} = \alpha\beta + \alpha\beta^2$$

One advantage of the negative binomial model is that it is associated with a formal likelihood so that information criteria are readily available. Thus, the Maximum Likelihood of Poisson model is again not appropriate whereas the negative-binomial-based models are much better in modeling the zero counts. Practically many researchers use negative binomial model if the Poisson does not fit the model.

3.5 Functional Form of TCM Model

3.5.1 Specification of the recreation demand function

One of the most important elements in a travel cost model is the specification of the recreation demand function which explains the visit frequency (e.g. a year) of the visitors as a function of travel costs (monetary and time costs) and other explanatory variables such as site characteristics, prices of substitute sites and some socio demographic variables (Freeman, 1993; Loomis and Walsh, 1997).

Specification of the functional form is crucial to the benefit estimates obtained. In practice the choice of the functional form needs to be determined empirically. But, there is some consensus that a semi-log gives the best results namely regressing the logarithm of visitation rates against travel cost, etc.

Englin (1995) compared linear, quadratic and semi log forms and got semi log is better in explaining the TCM demand function. The notable advantages of using the semi-log functional form include minimizing the problem of heteroskedasticity, as well as eliminating

the potential problem of negative trip prediction, which can occur using a linear functional form (Loomis and Cooper, 1990).

Haab and McConnell (2003) deduce that semi log and log-log functional forms are preferred to other types of model specifications since they reduce hetroscadesticity and multi-collinrearity problems, and gives efficient and consistent estimates.

Since data used were count data, the type of count data regression model type (Poisson regression model) was employed. Based on the different empirical literatures the most widely used functional form of the travel cost driven demand function is the semi-log form is preferred. So that, the available data empirically show direction for log-linear functional relationship of the dependent and independent variables was good.

Several studies have been carried out using the TCM so as to find the value attached to the environmental goods. Most of them used variables such as travel costs, income, travel time, age, substitute sites, distance traveled and country of origin. (ManzoteEmiriya, et al., 2013)

Why log-lin of PM is chosen? The empirical and radical reason for the use of log-lin model is absence of over-dispersion problem in this function. Count data by nature are skewed to the left because dependent variable consists mostly low values, so that the logarithm of the dependent variable helps to adjust its skewness to normal distribution.

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

The econometrics model used to find the recreational demand function and the consumer willingness to pay for the use value of the lake uses information from Travel cost method. Count data models have become the standard in single-site recreation demand models (Creel and Loomis, 1990). Regression models for counts differ from the classical regression model in that the response variable is discrete with a distribution that places probability mass at nonnegative integer values only. Count data distributions are also characterized by a

concentration of values on a few small discrete values (such as 0, 1 and 2), skewness to the left and intrinsic heteroskedasticity with variance increasing with the mean (Cameron and Trivedi, 1998).

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

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

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

b. **Truncation**: which is one of the characteristics of the data in this study, since data are collected on actual visitors and potential visitors are ignored, consequently, the data are

truncated at zero. Failing to account for truncation, leads to estimates that are biased and inconsistent because the conditional mean is misspecified.

c. **Endogenous stratification**: This is also another characteristic that is considered in the formulation of the model for on-site survey studies. Most of the time, the data obtained on-site are endogenously stratified. This is because a visitors' likelihood of being sampled is positively related to the number of trips they made to the site. That is, frequent visitors are more likely to be sampled. This problem (sometimes referred to as choice-based sampling) was first addressed by Shaw (1988).

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

$$\left(f\left(y|\mu, y \geq 1\right) = \frac{e^{-\mu}\mu^{y-1}}{(y-1)!}\right. \quad \text{.....(22)}$$

The dependent variable(y) is the visitation rate per year, truncated at zero.

3.5.2 Definitions of Explanatory Variables and their Expected signs

The following variables were identified as the main determinant for the number of trips (visitation rate) made to Bishoftu town to recreate at Babogayya Lake for the last 12 months.

Total trip cost (total trip cost): The travel cost includes all costs incurred during the travel time (cost of travel, accommodation, entrance fee and travel time cost) to the lake including a return[6].

6 : ¼ wage rate = Opportunity cost of time=1/4(hours wage(t1+t2))

The expected coefficient of the total trip cost is similar with demand theory(negative) and significant.

Income: Monthly net income of visitor is expected to play a major role in visitor's decisions concerning paying to visit recreational sites because the monthly income reveals the ability of individuals to afford a recreation. It is expected that those who have higher incomes, have higher visitation rate so, it is expected to be positive and significant.

Age: The study result shows that a negative and significant relationship between age and the number of trips to recreational site. Younger group are more likely to visit the lake than older ones. When age increases they are more likely to be engaged in different social activities and they are less likely to make visits to recreation sites.

Distance: This refers to the distance between the visitor's residence place and Babogayya lake. The visitors who are nearer to lake can have higher number of visitation rate and who are far will incur higher trip cost, So that the expected sign is negative.

Sex (sexv**):** This variable also included in the study as dummy variable, where a value of 1 is assigned if the visitor is male and 0 if female. This variable is included in the model to test whether the females or male are actively participate in recreational area. It is difficult to expect the sign of the sex.

Education level (edv): This variable represents the academic status of visitors. The study expects that as education level increases, although the educated people will take different higher responsibilities (short leisure time); they have better knowledge benefit of recreation so that the expected sign from study become positive.

Marital status: This variable is also included in the study as Dummy variable; 0 if the visitor is unmarried and 1 if married. Incidentally, the divorce and widow group of people were not included in the sample. The expected sign from study is positive.

Mode of transport (mtra): This variable is also included in the study to test the correlation of visitation rate and different modes of transportation and is entered as dummy variable. 0 If the visitor used public transport and 1 otherwise. In developing countries, particularly in Ethiopia, there are many transport problems due to different reasons. People who own car will have lower transport problem, so that they can have higher level of visitation rate.

Team: The study wants to analyses which form of trip people usually use, whether it is in group or alone. Dummy variable is created; 1 if visitors are in group and 0 otherwise. The study expects positive correlation.

Number of days spent on site: If people frequently visit the site, they spent smaller time on site. Hence, the expected result is negative correlation.

Preferred Seasons: This variable is included to test which seasons of the year the visitors frequently make recreational plan. Dummy variable is created; 0 if visitors more prefer winter and spring seasons and 1 if they prefer summer and autumn. Since; the summer and autumn seasons are more or less rainy seasons, it was difficult for transport, so the visitor visitation frequency will be small (negative correlation).

Days of preference: The variable is included in the study to look out which days are more frequently chosen. Dummy variable is created; 0 if visitors frequently choose weekends and 1 if it is on working days and holidays. The expected sign of coefficient of the days of preference is positive.

Visitation rate =F (travel cost, distance in km, age, sex, education, mstatus, mtra, team, income, days, rseason, days of preference)

In symbols

$$\mathbf{LnVrate = \beta_0 + \beta_1 sexv + \beta_2 distancekm + \beta_3 mstatus + \beta_4 agev + \beta_5 edv + \beta_6 lnincome + \beta_{74} team + \beta_8 mtra + \beta_9 rseason + \beta_{10} daysofprefe + \beta_{11} Tc + \beta_{12} Jobs + \beta_{13} orgntype + \varepsilon_i} \quad \ldots\ldots\ldots\ldots\ldots\ldots (23)$$

Continuous variables are:

Tc= Travel cost,

agev= age of respondents

Distance km= distance between the site and visitor residence place

Income = logarithm of monthly income of visitor

Dummy variables are:

Sexv=Sex when 1=male 0= Female

Edv= Education level dummy 0=if from Grade-8 to First degree, 1= if MA/MSC or above

Mstatus= Marital status dummy 1=if married, 0=if unmarried and 2=if divorce or widow

mtra= Mode of transport dummy 0= if public transport and 1= otherwise

days of preference= preferred days for visitation dummy,0= if weekends and 1= if working days and holidays

Team: 1 if in group and 0 otherwise

Rseason = preferred seasons for trip by visitor, dummy,1 =summer and autumn and 0 if winter and spring

Job= current job of visitor: 0= if investors and Businessmen and 1= if employed

Orgn type=organizational type of work place of visitors. 1 =if government /private employee and 0 = if international agency employees like UN/AU/NGO

$\boldsymbol{\varepsilon_i}$ = schochastic error term

β0, β1….. , β3 are regression coefficients which measure then percentage changes in the number of visits as a result of a unit change in the explanatory variable, other things remaining constant.

Substitute site as variable was excluded since all visitors coming here have other same substitute sites in Bishoftu

We hypothesize

$$\frac{\partial Lnv}{\partial tc} < 0 \text{……..(24)}$$

Based on the demand law which states that there is negative relationship between price and demand**.** In short , the demand of individual for the site is **Vi=F(tci, Xi)** where Vi refers to individual visitation rate, Tci refers to individual cost of travel and Xi refers to others socio-economic variables that affect the individual demand like income, age, etc.

3.5.3 Measurement of Travel Time Cost

The major difficulty with the travel cost method has been capturing effectively the value placed on travel time by consumers of recreation services. In practice, most studies estimate time cost as a proportion of the visitor‘s wage which assumes that individuals have a flexible working schedule, thus they can substitute work time for leisure time at the margin. Taking wage as an appropriate measure for calculating opportunity cost of time has some difficulties. Some of them are: First, Non-wage earners; people like unemployed, retired, and students, almost have no wage rate. Second, People who can’t substitute paid work for leisure hours; most people are constrained by fixed work-holiday schedules and may have no opportunity to. The trade-off may still apply to the self-employed and others who have discretion over their work schedules. Second the value and cost of time are different concepts. Third, their differences in understanding of the concept of the value and opportunity cost of time. Shaw (1992) maintained that the value and the cost of time are different concepts. Someone with a low wage could value time very highly. Some other studies consider leisure as a matter of an activity of time free of work, or of time off the job, then it might be conceivable to put a zero value on travel time. However, since time used for recreation can be allocated to alternative uses, time spent on a given recreational pursuit must have a cost. Opportunity cost of time in this case includes other activities like reading, studying or indeed going to another site for recreation. Forth, differences in formula of calculating the Opportunity cost of time; at least there are four other methods used by previous researcher to find the opportunity cost of time.

First, McConnell and Strand (1981) assumed that the cost of time would be some proportion of the visitor‘s wage rate and that proportion could be estimated from the data using regression analysis. Second, Cesario (1976) asked individuals directly about their opportunity cost of time. But the result is affected by the respondent judgment. Third, the opportunity cost of time has been also derived by dividing the total hour work by each respondent‘s gross

income. Forth, Shaw (1992) estimated the shadow wage by using contingent behavior questions about respondents' willingness to work further hours along with actual working decisions.

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

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

This particular study has used wage rate as a proxy for the opportunity cost of time and 25% of wage rate is taken as an opportunity cost of time, which is the lower bound in the above finding. Due to constancy of work-hour-leisure, calculation of opportunity cost of time, in developing world is not far from error.

CHAPTER FOUR

4.0 Data Analysis and Discussion

4.1 Data Analysis

The collected data were compiled, sorted, edited, classified and then entered into the computer. Based on the data type and characteristics appropriate data were analyzed by using Poisson regression (semi log) model from Stata.12 version. For analysis of the data both descriptive and econometric methods of data analysis were employed.

4.1.1 Descriptive statistical Analysis of most important variables

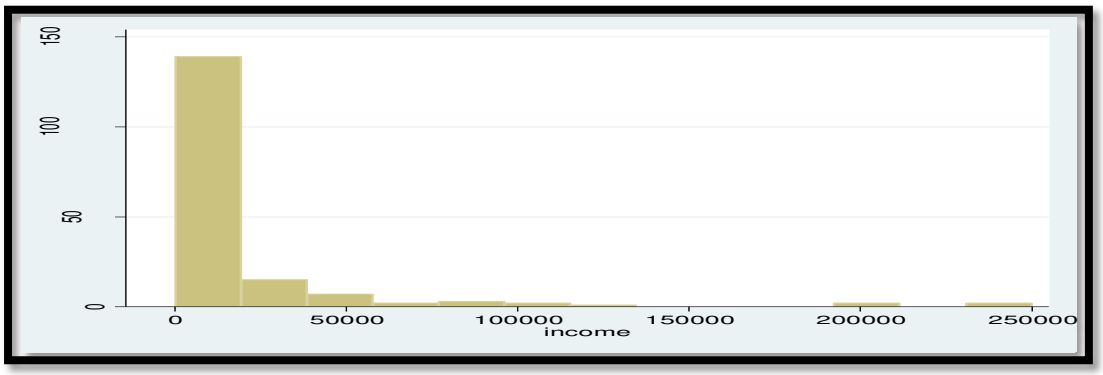
Table 4.1: Analysis of monthly income days of Respondents

Variable |	Observation	Mean	Std. Dev.	Min	Max
Monthly income |	**173**	**18014.2**	**37776.74**	**200**	**250000**

Source: own on-site Survey, (2014)

Interpretations:

The respondents mean monthly income is birr 18,014, about 78.61 percent of the respondents income is less than the mean.



Histogram 4.1: Respondents monthly income frequency distribution

As it shown by histogram the majority of respondents' monthly income lies below birr 50,000.

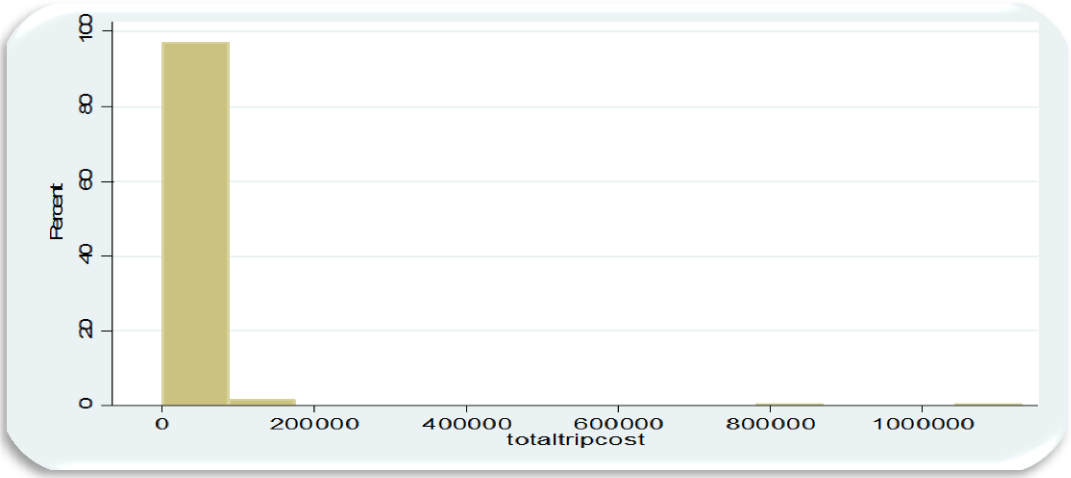
Table 4.2. Analysis of total trip costs of Respondents

Variable |	Observation	Mean	Std. Dev.	Min	Max
Total trip cost |	173	20174.76	107289.2	415	1130225

Source: own on-site Survey, (2014)

Interpretations:

As it was explained on above table, the mean of the trip cost of respondents is birr 20,174.76.



Histogram 4.2: Total trip cost distribution of respondents (percent)

On average, the respondents of study visited nature-based recreation about 4 times per year. From different resorts and recreational centers on the Babogayya Lake, more than 65 percent of visitors preferred Babogayya resort. Because of service quality with fair price, good customer holding, and lack of entrance fee.

The visitors visited Babogayya Lake for different reasons. Recreational activities at the lake include sightseeing, bird watching, walking, relaxation, exercising, eating seafood and drinking, photographing, fishing, swimming, and enjoyment from beautiful weather, scenery of lake and landscape, and water sports like boating and sailing. From survey more than 72 percent of the respondents prefer enjoyments from beautiful weather, scenery of lake, sightseeing and photographing.

4.1.2. Secondary Data analysis

Table 4:3 Bishoftu Town tourist flows and Revenue data

Year	2007/8	2008/9	2009/10	2010/11	2011/12	2012/13
Tourist type						
1.Domestic visitors	695	16,752	45,757	60,996	125,847	230,000
2.Foreign visitors	89	2845	2953	3347	3620	4018
Total number of visitors	**784**	**19,597**	**48,710**	**64,616**	**128,467**	**234,018**
Revenue from domestic visitors	104,250	2,512,800	6,863,550	9,149,400	232,331,229	245,000,000
Revenue from foriegm visitors	17,800	569,000	590,600	669,400	9,426,561	11,451,300
Total revenue	**122,050**	**3,081,800**	**7,454,150**	**9,818,800**	**241,757,790**	**256,451,300**

Sourvce: Bishoftu Culture and Tourism bureau ,(2013)

Interpretation:

As it shown in the above table, there is the increment of number of tourist flow per year simultanesuly with inreament of the revenue generation .

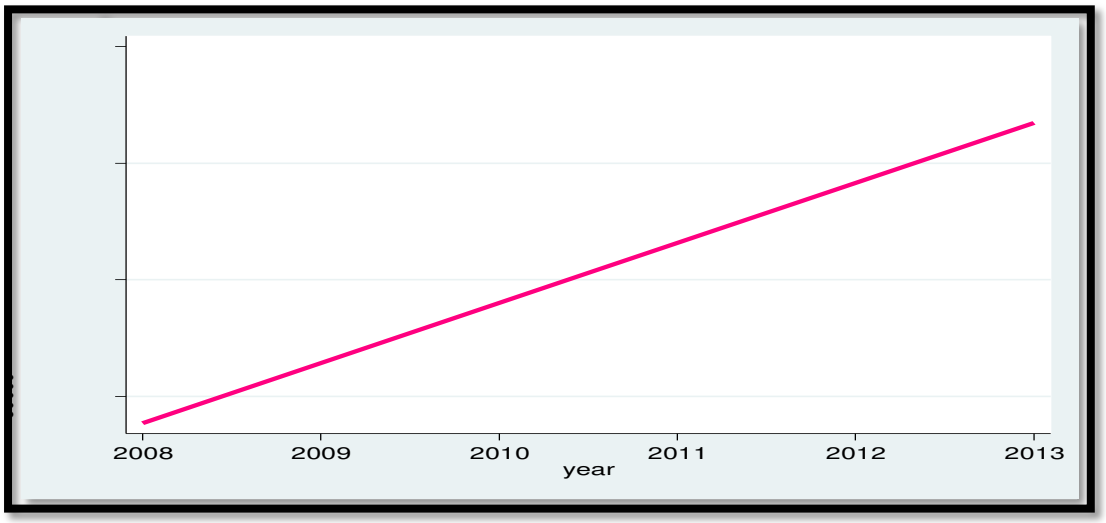


Figure 4.1 Bishoftu town Tourist flow curve per year

As curve shows by upward sloping the number of tourist flow to bishoftu town is increasing at increasing rate per year.

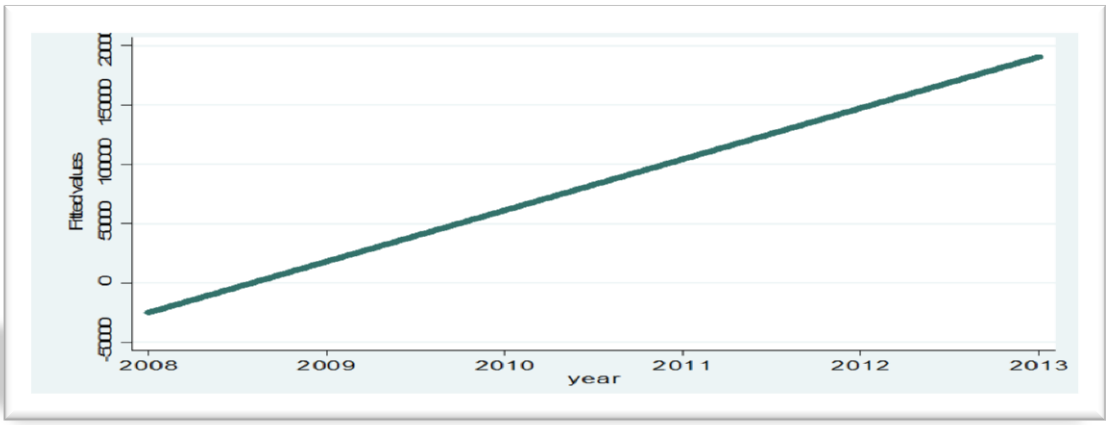


Figure 4.2 Bishoftu town Revenue curve per year.

Bishoftu town Revenue curve has positive slope. It shows by upward sloping the amount of revenue generated is increasing at increasing rate per year with paralel of number of tourist.

4.2.1 Econometric Analysis

4.2.1.1. Test Statistics

The data were checked for problems of outliers, violation of Poisson regression model assumption, problem of correlation (multicorrelation) and homoscedasticity (heteroscedasticity). Hence econometric regression analyses with count data are often associated with multicollinearity and heteroskedasticity problems of explanatory variables; the model is checked for these problems.

a. Multicollinearity Test

Multicollinearity test is done to check correlation problems among covariates. Correlations among independent variables can be assessed by the variance inflation factor (VIF-test) and contingency coefficient tests for continuous and discrete variables respectively.

According to Gujarati (2004), VIF is a factor by which the sampling variance of an estimator is increased due to multicollinearity among independent explanatory variables. It is related to Rj^2 where Rj^2 is the coefficient of determination among explanatory variables as expressed (VIF $=1/(1-Rj2)$)or just directly applying the VIF command 'vif' during regression process, it is possible to see the degree of multicollinearity. VIF value less than 10 is recommendable to undertake reasonable regression analysis nevertheless a greater than 10 shows the presence of multi-co linearity problem among explanatory variables (Gujarati, 2004). Thus, as the VIF result is displayed in appendix 1.F, there is no detection of multi-collinerity problem across continuous explanatory variables. Additionally, the correlation matrix displayed in appendix[7] shows no correlation higher than 0.4056, which indicates that multi-co linearity is not a problem within our data set. The necessary variables could thus initially be included in the analysis.

b. Heteroscedasticity test for inconsistent variance

A more fitted model needs to have a constant variance where there is no a problem of heterosckedasticity across observations. When the Poisson model is employed, the over-dispersion problem is usually expected, so that problem of heterosckedasticity is more likely to exist. Therefore, to correct this inconsistent variance problem, robust regression is employed.

To estimate the recreational demand of Babogayya lake recreational sites, the TCM environmental valuation method and econometrically, the count model (Poisson distribution) were employed.

The econometric model attempts to make some analysis and make inferences based on the information obtained from the sampled respondents. These econometric methods are

*7 : Further reference for detail, Appendix:-*1.A

employed to estimate consumer surplus of the visitors and mean WTP of the respondents using TCM which would help to find the economic use value of the study area.

4.1.2.2 Estimation of the Recreational Demand for use Value of the lake

Recreational demand function at a given site is related to the number of trips made by an individual and trip price or personal preference. The non-negative and integer nature of trip demand suites the count data model to estimate recreational benefits. The application of count data model to assess recreation site demand by adopting on-site survey encounters the problems of asking the frequency of visits and truncated non-user samples. So, the study follow Shaw's (1988) on-site Poisson model to correct for these two evaluation problems. Moreover the study employed semi log and double log functional form to estimate the recreational demand of the site. The total travel cost and other socio-economic variables are included in the model as independent variable. Total travel cost contains transportation costs of visitors, converting round-trip distance from home to destination site into ETB and opportunity cost of time8. Without estimating travel time for a recreation site, the consumer surplus of benefits will be underestimated. The functional relationship is presented below:

LnVrate= 0.5366-0.0525sexv -0.0077distancekm -0.2344 m status +0.0007agev -0.153 edv

-0.000468 income -0.4276team + 0.2773mtra +0.0902 rseason + 0.2821daysofprefe

- 0.000243 totaltripcost + 0.0568job + 0.1242 orgntype+ ε……(25)

$$V\,rate = e^{\begin{array}{c}0.5366-0.035\ \text{sexv}-0.008\text{distancekm}-0.23449\text{mstatus}+0.0007\text{agev}-0.153\text{edv}-0.000468\ \text{income}-0.427\ \text{team}+\\ 0.278\ \text{mtra}-0.09\ \text{rseason}+0.28\ \text{daysofprefe}-0.000243\text{totaltripcost}+0.057\text{job}+0.124\ \text{orntype}+\varepsilon i\end{array}}$$

……General exponential equation of individual demand

8 : Opportunity cost of time(ETB)= (1/4*hourly wage*travel time in hour)

Estimated demand equation can be;

LnVrate= 0.5366- 0.000243tc ….linear individual recreational Demand (I)

Or $\mathbf{V\ rate} = \mathbf{e}^{0.5366 - 0.000243\ totaltripcost}$ …Exponential individual recreational Demand (ii)

The primary aim of travel cost method is finding the use value of recreational demand benefits and computation of consumer surplus for each recreational trip. The appropriate recreational demand function is derived from the regression result between the expected number of trips and travel cost. The robust regression result from Poisson model (log-lin) is presented as below.

Table: 4.4 A maximum likelihood estimation of the Poisson regression

(Dependant variable = number of trips)

Explanatory variable	Expected coefficient Sign	Poisson coefficient (semi- log)	Marginal effect	p-value	Mean Value
Sex		0.0460	0.0525	(0.297)	0.683
Distance	-	-0.0066	-0.0077	(0.038)**	49.249
Marital status	+	-0.2026	-0.2344	(0.012)*	0.515
Age	+	0.0006252	0.0007	(0.997)	33.451
Education	-	-0.139397	-0.153	(0.297)	0.15
Income	+	-4.06e-06	-4.68e-06	(0.035)**	18,014.2
Mode of transport	+	-0.3202	-0.4276	(0.000)***	0.515
Season	-	0.2419	0.2773	(0.001)***	0.6
Days of preference	-	0.0789	0.0902	(0.505)	0.315
Team	+	0.1058	0.2821	(0.490)	0.95
Total trip cost	-	-2.8e-06	-2.430e-06	(0.018)**	20,174.76
Job	+	0.0490	0.0568	(0.754)	0.3873
Orgn type	+	0.2449	0.124 2	(0.064)*	0.8208
Constants		0.5366	NA	(0.000)***	NA

Source: own computation

* 10 percent level of significance

** 5 percent level of significance

*** 1 percent level of significance

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

The Poisson model (log-linear) is selected as an appropriate model that fits our data because of the absence of over dispersion problem. Over dispersion occurs when the variance is larger than the mean for the data. This may be due to few respondents making a large number of trips while most respondents making only a few. The mean of the visitation which is 1.2355 is higher than the variance of the visitation 0.0033, an indication of absence of the over dispersion problem (see appendix 1.B for summary statistics). Furthermore, the log-likelihood ratio (LR) test is formally more preferred to test the significance of the model. The log-likelihood ratio test is estimated as follows:

$$\boldsymbol{LR = -2(REstictedLog - Unrestrictedlog)} \quad \text{.....(26)}$$

Where the restricted log is the log-likelihood only with constant and the unrestricted log is the log-likelihood of the full model. The calculated LR chi ^{2} (13) is *79.55* and the critical value of the test with 13 degrees of freedom (χ^2)(13) at five percent significant level is 22.362. The calculated value is higher than the tabulated value at five percent significant level. Therefore, the likelihood ratio statistic test models goodness-of –fit under the null hypothesis that all parameters are zero can be rejected. Another test for the model specification is the Akaki information criteria (AIC) and Bayesian Information criteria(BIC). Compared to other models their values are smaller so that the Poisson regression model is good for estimation. (See appendix: 1.C). Finally, when a goodness -of-fitness test of the model is tested in post-estimation by command "estatgof";it gave the evidence that the test is insignificant, so that we fail to reject the

null hypothesis which says the Poisson regression model is appropriate.(See appendix: 1.E).

Since, goodness of test is insignificant, it is not necessary to go to search for another model, like Negative Binomial distribution[9].

The researcher want to make clear that if poison regression model is preferred, why different form of Poisson regression model like Truncated Poisson regression models or double linear form of Poisson regression model and others are not chosen? The statistical results of such models provide evidence that, there is over-dispersion problem and the main determinant variable coefficient is insignificant.

4.1.2.3 Determinants of individual Recreational Demand of the lake

The demand function of the independent variables includes travel cost, Travel distance, Income, sex, age, marital status, Education level, recreational hours on site, preferred days and seasons and form of trips (individual or group). It is expected that travel cost, travel distance, sex, education, hours spent on onsite, preferred days, preferred seasons and age are negatively correlated with the number of trips; and income, marital status, Mode of transport, and team are positively correlated with the number of trips.

Theoretically, the most important coefficients in the study for the purpose of gaining consumer surplus measures is the travel cost.

Total trip cost: The travel cost is the sum of all the expected trip costs including the travel time cost, entrance fee, accommodation cost and etc. The travel cost coefficients have registered the expected sign (negative sign) and significantly affect visitation rate. The travel cost coefficients are consistent with the demand theory, which stipulates that when the price of travel increases then the number of visits will decrease. The negative sign was obtained because as the costs of travel to the site increase, one is expected to take fewer trips per year,

9 : Applied Econometrics using stata, R. Pérez Truglia,2008

ceteris paribus. An increase in the travel cost by one dollar will decrease the number of trips made to the site approximately by $0.0243(2.43e^{-04})$ percent. This means that people living closer to the site made many trips while those living far from the site made fewer trips.

Poor and Smith (2004), found that the price or travel cost coefficient estimate are consistent with demand theory, in that the demand for visit is inversely related to price or travel cost. Thus, its sign is expected to be negative (Nam and Son, 2001; Ortacesme et al., 2001; Sitotaw, 2003).

Kaliampakos and Damigos (1999) carried out a study in Greece (Athens) by using TCM. Variables adopted were travel cost, income, substitute sites, occupation and age. They found out that travel cost, income, substitute sites and occupation are negatively related to the number of visitation rates.

Income: Theoretically, Visitor's monthly income is also considered as one of the main variables that affects the number of visits positively. The expected sign of coefficient of the income (positive) was not registered. But, as described in above table, the monthly incomes of the respondents negatively affect number of trips made to the lake and but, the coefficient for income is significant. Because, many visitors who made many trips are those who come from places near to the site and due to non-availability of entrance fee for all of the (Pérez Truglia,2008) recreational sites. So that, income level as major determinant variable. Additionally, there a number of recreational centers and resorts around the lake in which individuals choose the site based on their level of income. This doesn't determine frequency of trips should be made by individuals. Here, if the incomes of the respondents increase by one dollar, the visitation rates decrease by **$4.68e^{-04}(0.0468)$** percent. Finally, the on-site expenses are very small including the entrance fee which weakens income as the main determinant variable on the number of visits. As visitors income increases to higher level people also prefer clean and attractive environment during their time of visits. So that the

higher income group of people may assume that there is other clean and attractive environment than Bishoftu for their choice or the richer people opportunity cost of leisure hour is high. For reasons outlined above, monthly income of visitors is an important variable but has a very small effect on the decision to make more or fewer trips. As supportive evidence, one finding come with that the relationship between income and the total number of visits is negative correlation (Smith, (1993).

In general, according to this study income and total trip cost are more determinant and significant of visitation rate. Both variables identified as they significantly and negatively affect number of trips made.

Age: The study result shows that a negative and significant relationship between age and the number of trips to recreational site. Younger group are more likely to visit the lake than older ones. When age increases they are more likely to be engaged in different social activities and they are less likely to make visits to recreation sites. However, the relationship between visitors' age and the number of visits is negative. As supportive evidences, (Sitotaw, 2003) finding shows that a significant but negative sign. Oppositely, Ortacesme et al., (2001) and Blayac et al., (2011) found a significant but a positive relationship to trip demand suggesting that as age increases the demand for recreation increases.

Distance: This refers to the distance between the visitor‘s residence place and Babogayya lake. The visitors who are nearer to lake can have higher number of visitation rate and who are far will incur higher trip cost. The obtained sign from study result is also negative (Nam and Son, 2001; Bedate et al., 2002). The distance between the site and visitors residence place, is negatively affect visitation rate and significant at five percent. When the distance increases by one kilometer, the visitation rate declined by 0.66 percent, due to higher level of total trip costs between visitor residence place and site, (see above table).

Education level (edv): This variable represents the academic status of visitors. Dummy is created to include in the study, 0 if the visitor academic status is between grade eight and first degree and 1 if the visitor academic status is second degree and above. From the study result the educational level coefficient sign is negative and insignificant. Since visitors whose education levels were high, their leisure hour is too short, so their number of trips per year is small.

Marital status: This variable is also included in the study as dummy variable: 0 if the visitor is unmarried and 1 if married. Suddenly, the divorce and widow group of people were not included in the sample. The expected sign from study was not registered (positive); but, significantly determine visitation rate.

Mode of transport (mtra): This variable is also included in the study to test the correlation of visitation rate and different modes of transportation and is entered as dummy variable: 0 If the visitor used public transport and 1 otherwise. In developing countries, particularly in Ethiopia, there are many transport problems due to different reasons. People who own car will have lower transport problem, so that they can have higher level of visitation rate. The expected sign from study was registered (positive) and significantly determine visitation rate.

Team: The study wants to analyses which form of trip people usually use, whether it is in group or alone. Dummy variable is created; 1 if visitors are in group and 0 otherwise. The study output shows that there is negative correlation and significantly determine.

Number of days spent on site: If people frequently visit the site, they spent smaller time on site. The study result shows that positive correlation and it is insignificant.

Preferred Seasons: This variable is included to test which seasons of the year the visitors frequently make recreational plan. Dummy variable is created: 0 if visitors more prefer winter

and spring seasons and 1 if they prefer summer and autumn. According to study result, there is negative correlation and it is insignificant to explain it.

Days of preference: The variable is included in the study to look out which days are more frequently chosen. Dummy variable is created; 0 if visitors frequently choose weekends and 0 if it is on working days and holidays. The study result shows that there is positive correlation and it is insignificant to explain the number of trips. For interpretation of the other explanatory variables (see table 4.16)

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

4.1.2.4.1. Individual Demand Function and Benefit

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

The linear semi log travel cost model hypothesis is:

Functionally,

LnVrate= 0.5366- 0.000243 tc……(27)

Where,

lnVrate is the logarithm of the visitation rate and

Tc refers to travel cost of trip.

ε_i refers to the stochastic error term

The estimated Marshillian demand function for Bishoftu town (Babogayya Lake) can be written as:

$$\boldsymbol{Vi = e^{0.5366 - 0.000243\ tc}} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (28)$$

Vi= 2208.2305 $e^{-0.000243tc}$ …..Exponential function of individual recreational demand of Babogayya Lake.

Lnvi=0.5366-0.000243tc…….linear function of individual recreational demand of Babogayya lake.

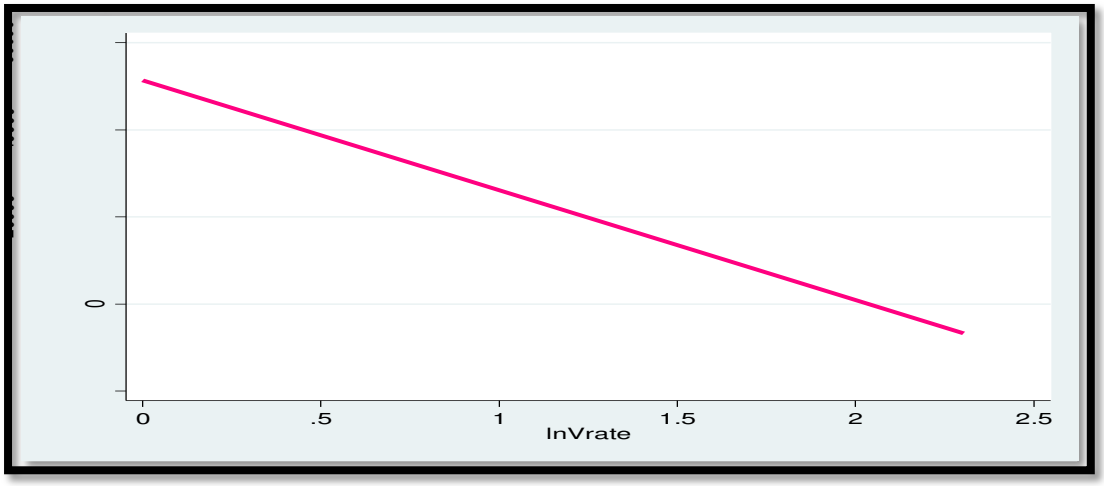


Figure 4.3: Estimated individual recreational demand curve of Babogayya Lake.

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

Now, integrating the inverse demand function between zero and mean trip of 1.2355, it is possible to estimate the recreational benefit obtained from the Lake. Thus, the estimated recreational benefit for the average number of visits is birr 12,646.9136 or $636.5373*. The recreational benefit of Lake Babogayya recreational site per visit per person is, therefore, estimated at birr 10,236.2716 or $ 515.9775*. The annual total recreation value of the Lake is

the multiple effect of number of visitors registered within a year and recreation benefit per person per visit. Visitors' data for the last year starting from January 2013 to December 2013 was taken and it is found around 234,018 registered visitors. Thus:

Total Recreation value = 10,236.2716*234,018 = *birr 2,395,471,807.2888= 120,567,527.5332464USD**

**(taking the may 30, 2014 exchange rate where 1USD = 19.8683 ETB from Oromia international Bank)*

However, this value is all round values related to outlays made from the start of the trip to the Lake, recreation in the Lake and up to the trip made back to home from the Lake. Thus, it is important to apportion the onsite recreational benefits from the whole benefits of recreation related experience. According to respondents' response about their utility proportion to the onsite benefit of Lake Babogayya recreational site relative to the offsite, about 75.32% of enjoyment belongs to the onsite recreation. Given this information, on-site recreational benefit per visit per person can be estimated by multiplying the estimated benefit of the recreational benefit of the Lake recreational site per visit per person with the percentage enjoyment being on on-site. That is: 10,236.2716 * *75.32%* = 10,236.2716 * *0.7532 = birr 7709.95976912=$388.0534*

Now, to aggregate annual on-site benefit, 234,018 numbers of annual visitors of the Lake were taken. Then, recreational benefit per visit per person can be translated into annual onsite recreational benefit as presented below:

*7709.95976912** 234,018 = *birr 1,804,278,780= 90,811,935.5959USD*

In a 2013/2014 fiscal year, the revenue generated from visitors Babogayya Lake recreation site by Oromia Regional State, Bishoftu Town of Office of Tourism and Culture is

approximated to birr 256,451,300 or $12,907,561.2911. As compared to the total annual benefit estimation result obtained from recreation activities, the figure shows that the revenue collected from total aggregate benefit of the Lake is only around 14.2135% while the remaining is efficiency loss of resource use and management.

Despite geographical, visitors and time frame differences, it is possible to compare recreation site benefit valuation studies conducted in Ethiopia with Babogayya Lake recreation site benefit estimation. In this regard Sitotaw (2003) attempted to value the benefit of outdoor recreation in Langano using the travel cost method: the case of Wabi-Shebele Langano recreation site. Thus, the total annual on-site recreational benefit of the site was estimated to be Birr 8,685,774 (USD 1,009,974) and Ali Y. (2011) conducted study in Semen Mountain National and the result from Semen Mountain National Park show that an aggregate annual recreational economic benefit was birr 48,562,086.4 ($ 2,943,156.7).

Atalel (2012) also conducted study in estimation of use value of the Tana Lake and study result show that aggregate total recreational benefit is about (21,003,246.19 USD)

As compared to findings of other study, the estimated aggregate recreational benefit of Babogayya lake (*90,811,935.5959USD*) is above those of other sites. This may be because, research assumptions and procedure followed and site characteristics in these sites to some extent differing to one another. One possible reason for small recreation value in other study of recreation site may be due to specific nature of the study which may only consider café, Restaurants or Hotel services regardless of the entire Lakes recreation sites. The other reason could be all visitors' which have higher frequency originated from a near distance place where the trip requires low cost due to proximity and this in turn understates the value of the site. Moreover, if the registered annual visit of site is too small as compared to other sites, this may lead to underestimation of total benefit. More importantly, hence the study considers

whole Lake where it has various attribute and sites and it is relatively better accessible, the estimated recreational annual benefit could be reliable.

As compared to other sites, better proportion of total annual benefit is extracted as revenue in this site. Since the total revenue collected from total aggregate benefit of the Lake and the total annual recreational benefit estimated are not equal, there is the annual recreational benefit lost due to efficiency loss of resource use and management in the Lake.

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

Consumer surplus is the value of a recreation activity beyond what must be paid to enjoy it. The following Figure illustrates the concept of consumer surplus when consumer surplus is the area below the demand function (D0) and above the expenditure line (E). Consumer surplus is also referred to as net willingness to pay, or willingness to pay in excess of the cost of the good. Total economic use value is consumer surplus plus the costs of participation.(Rosenberger and Loomis, 2001). I.e. total willingness to pay for trips (WTP) = CS (consumer surplus)+Area below the Demand Curve (total trip cost) and CS= WTP-total trip cost

There are some controversies on the employment of different approximation calculation of the integration of area below the trip demand function and above the travel cost function

for calculation of Individual CS. First, Consumer surplus (CS) or recreational benefit for access to the site is equal to $\left(\mathbf{CS} = -\left(\frac{\boldsymbol{\alpha}}{\boldsymbol{\beta Tc}}\right)\right)$ where α is the mean of the number of trips and β is coefficient (slope) of travel cost.(Christopher L.Ellis,2005). Second, for a semi-log function form, an approximation of average per trip consumer surplus is – ($1/\beta_{TC}$), where $\beta_{TC}$is the travel cost parameter (Adamowicz and others 1989).

Additionally, the estimated coefficients were used to calculate the consumer surplus per predicted trip defined as $\mathbf{-1/\beta_{TC}}$, where β_{Tc} is a parameter estimate for the travel cost variable. (Ovaskainen, 2012).

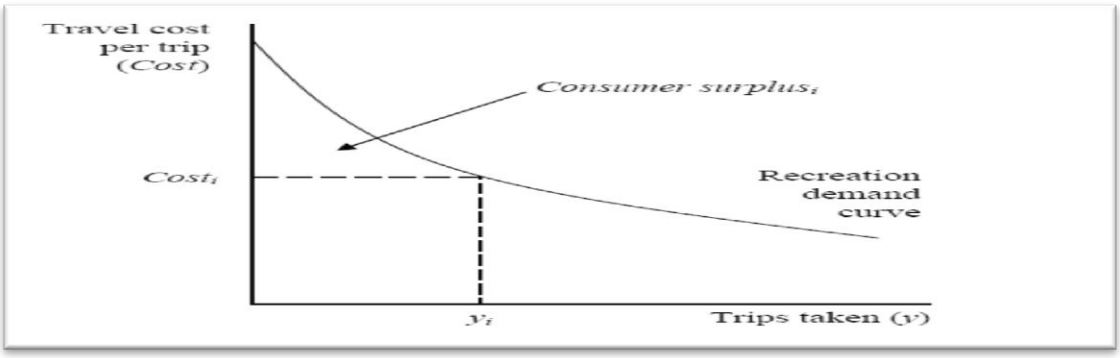


Figure.4.4 Expected recreational demand curve with Consumer Surplus

Average per-trip consumer surplus estimates for groups traveling to the recreational site can be estimated using the negative inverse of the travel cost coefficient (CS = -1/β2).

Since this study estimate individual marshillian demand equation in semi-log functional form,to calculate the CS the second one is selected.

When we calculate the Average consumer surplus per group per trip,we should assume that travel time and travel cost are become zero.

Net economic benefits or consumer surplus is a measure that indicates the value of a resource. In the case of unpriced access to recreation resources like the lake, it represents the

dollar amount that individuals are willing-to-pay to use the resource above and beyond what they must pay to use the resource.(J. Bergstrom and J.Gill,2004).

During the survey, average cost of the recreation including total trips cost was birr 20,174.76. Average consumer surplus per group or vist per trip= -1/Btc . CS=-(1/-0.0013)= birr 4115.2264 or $ 207.1253.

So average recreational value per person is obtianed by the division Average consumer surplus per group per trip to the average number of trip per year. Therefore, the Average consumer surplus per visit per person is equal to birr 4115.2264 /1.2355= birr 3330.8185 or $167.6449.

Consumer surplus refers to recreational value. The recreational value for the average visit for Poisson model is 4115.2264ETB or $ 207.1253. Therefore the recreational value of the site per visit per person is estimated to be approximately 3330.8185ETB or $167.6449. . In other words, on site the individual recreational benefit is equal to 3330.8185 or $167.6449. .

Price (travel cost) elasticity (ε_p) = B_{tc}* average TC=-0.000243*20174.76= - 4.903.Thus the price elasticity at mean of travel cost, is elastic (percentage change in the visitation rate is greater than percentage change in the travel cost. Or $|\varepsilon_p|>1$).

If per year on average , the total number of visitors of Babogayya lake is 234,018[10,] then their avaerage total consumer surplus can be obtianed by multiplication of the Individual CS with Total number of visitors per annum. Hence, TCS=3330.8185 *234,018 is birr 779471483.733 or $39,231,916.3559.

The consumer surplus value obtained for the recreational use value of the Lake is comparable with various recreational valuation literatures. From Lake Tana view point, the study conducted by Atalel (2012) estimated that the consumer surplus of Tanalake, is7, 321,490.43

10 : Own survey (2014)

USD and Ababio D. K. A. (2012) on Kakum National Park in Ghana attempted to derive the recreational monetary value of the site using a survey of 246 visitors, the on-site consumer surplus was computed to be $46.40 per person per visit (considering 2009 exchange rate). Translating it into an annual aggregate value per annum, it accounts $5,849,416.

Even though it is not fair to compare the consumer surplus estimates of different recreational site across countries and time horizons due to various distinguishing features; nature of the site, visitor's characteristics and time frame where the study was done, but it is possible to see where the consumer surplus estimate of Babogayya Lake lays. From different valuation of recreation site, the aggregate annual consumer surplus ranges from minimum $50,000 to maximum$862,000,000.

The minimum value was obtained by Ortacesme V. (2002) in Turkey. Recreational use value of Kursunlu Waterfall Nature Park in Antalya province of Turkey was studied using the Individual Travel Cost Method with a semi-log demand function administering 280 sample sizes. The results showed that Kursunlu Waterfall Nature Park has an annual consumer surplus of $50,000 with July 1999 exchange rates. Whereas, a study conducted in Australia to value a Mooloolaba recreational beach visit brought maximum annual consumer surplus estimate of $862,000,000 (Blackwell B., 2007).

Other similar studies are found with estimated consumer surplus values which fall in this range. In Australia, Fleming C. M. and Cook A. (2007) conducted their study on Lake McKenzie from Fraser Island's natural sites to estimate a recreation value of the Lake using travel cost method. Once adjustments for multiple-site visitors were made, the method yields on-site recreational values of the Lake to be $31,789,212 per annum or an average of $242.84 per-person. Poor P. J. and Smith J. M. (2004) estimate recreational role of a Historic St. Mary's City of Maryland in USA through travel cost method variant: zonal travel cost

method. Using a three years of visitor sample data, individual consumer surplus was $19.26, $9.93 and $8.00 for the linear, semi-log and log-log models, respectively. The estimated aggregate three-year aggregate annual consumer surplus for visitors to the site for the linear, semi-log and log-log models are $176,551, $94,510 and $75,493, respectively. However, it is important to note that the semi-log functional form of visitor demand with a consumer surplus ($94,510) is a comparable result with regard to Lake Tana due to similarity in demand functional form. Again, McKean J. R. and Taylor R. G. (2000) study the demand analysis of outdoor recreation demand and expenditures on Lower Snake River Reservoirs in Russia. The average annual consumer surplus was $596 per person per year. Total annual consumer surplus by recreationists at the reservoirs was estimated at $31,578,464. A recent finding from Malaysia brought annual consumer surplus per individual to be around $747 while annual total benefit is estimated to be $57,890,000 during the estimation of demand for island based recreation on Redang Island using the Travel Cost Method (Muhamad S., Sanusi N. and Kamil M., 2010).

The consumer surplus finding which is estimated at $39,231,916.3559in Lake Babogayya is consistent with other studies in fact differences on site and visitors' characteristics and time frame considerations are subject of limitations to make absolute comparisons among sites. From this regard, it is rational to compare the consumer surplus of Lake Babogayya with other recreation site consumer surplus estimations within the country. Because, to some extent it is possible to minimize sites' characteristic and visitors' socioeconomic differences between abroad and home sites. A study conducted by Sitotaw (2003) use the exponential demand function to estimate consumer surplus for the average number of visits in Wabi-ShebleLangano recreation site in Ethiopia. Thus, individual consumer surplus per visit was approximated to be Birr 440.52 (USD 51.16) and a translated aggregate consumer surplus of birr 5,082,440 (USD 590,981.39) for the total number of 11551 visits per year. In the same

region, Mehamed Ali (2007) estimated the recreation use value of the Wondo Genet Wetland Ecosystem using single site travel cost method. Accordingly, the aggregate consumer surplus is estimated at around 20, 000,000 birr per year ($2,200,000 per year) for the approximately around 36,000 visitors. In the Northpart of the country, Ali (2011) studied the economic benefit of Semen Mountain National Park with travel cost and choice experiment methods. As a result, the annual total consumer surplus was estimated to be birr 48,562,086.4 ($2,943,156.7). Atalel (2012), also attempted to estimate Tana lake annual Consumer surplus value is(7,321,490.43 USD).Compared to the result of other study, the annual Consumer surplus value of Babogayya lake($39,231,916.3559) is larger than others.

In General, the results of study show that:

1. The estimated on-site individual visitor recreational demand equation of Babogayya Lake become, LnVrate= 0.5366- 0.000243totaltripcost
2. The total recreational benefit per year of the Babogayya Lake is $*90,811,935.5959.*
3. The total recreational consumer surplus per year of Babogayya Lake is $39,231,916.3559.

On average, the bishoftu town total number of visitors of 2013/14 is 354,018[11] if we calculate total number of the recreational value of bishoftu town is birr 1,179,169,703.733 or $59,349,300.3294

11 : Bishoftu town culture and tourism bureau report

CHAPTER FIVE

5.0 Conclusion and Recommendations

5.1. Conclusion

Environmental valuation technique application is still infant in Ethiopia. Only a few papers were written even though there is the natural resource management and planning, conservation and protection is the widely known and common problem of least developing countries.

Natural resources have many direct and indirect benefits. Nature based outdoor recreational sites has significant economic role in the economic development. It is a source for foreign exchange earnings, employments generation, individual income source, keeping natural ecosystem and quality for sustainable development and etc.

The major study objective is to value the recreational outdoor benefits (use value) of Babogayya Lake (Bishoftu town) by application of TCM. The focus is only the use value of the Babogayya Lake, by excluding non-use value. For attainments of the study objective both secondary data and primary data were used. For collection of primary data both questionnaire (both open ended and closed) and interviews were employed. The questionnaire is randomly distributed for on-site visitors of the lake.

For analysis of collected data from the recreational sites located on the Lake, both descriptive statistics (table, histogram and graph) and econometric model (Poisson Regression Model of Count data model) were applied with fitting of theoretical implications.

The study estimated that the individual outdoor recreational demand (LnVrate= 0.5366- 0.000028totaltripcost), total annual recreational benefit of the site (*$90,811,935.5959)* and total annual consumer surplus of the site ($39,231,916.3559).

The study result shows that the total trip cost and monthly income of the respondents negatively and significantly determine the number of trips of the site.

5.2 Policy implications

1. The Oromia Tourism and Cultural Bureau and Bishoftu Town Tourism and Cultural Bureau should conduct good promotional/advertisement activities to welcome both domestic and foreign the private tourism investors and raising Local Community participation to reap the potential benefits of the tourism industry.
2. Awareness creation about total economic and benefits of natural resource for all people and mostly for Bishoftu town residents and surroundings' is necessary.
3. There are flow of huge dirty gully erosion by carrying different (dirty liquid (may contain chemicals from factories) and solid materials, soils and stones) during summer, this one of the threat of seven lakes of Bishoftu town. To alleviate or minimize this problem, for conservation and protection of these lakes, the government body (Ethiopian Environmental agency) and Nongovernment bodies should actively participate and give solution for it. Here, we should learn from Haramaya Lake which suddenly dried in short period of time. Here proactive program should be formulated before natural resource is damaged or endangered.
4. From visitors' point of views, different people want to take recreation at site in different ways. Some people need song all day, others need silence or quietness. Based on this

many people need quietness/silence and simply observe the nature conditions, so that to solve this problem quality and silence of the environment of recreational sites should be increased.

5. Some religious individuals commented that the cultural values should be upheld through setting limits on closings and behaviors that are not consistent with social norms.
6. The town tax service not go up to the different resorts, to solve this problem, the Bishoftu town administration should arrange the town tax service up to the resorts or different resorts should take their customers from bus station by their own vehicles.
7. To maximize its benefits Bishoftu town should develop some strategy to avoid some natural resource management efficiency loss.
8. Some infrastructural facilities (there is traffic problem) between the major visitors (Addis Ababa residences) and Bishoftu town should be improved.

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APPENDIXS

Appendix: 1.A Correlation Matrix

	Vrate	sexv	distan~m	mstatus	agev	edv	job	orgntype	income	team	rseason	daysof~e	mtra	totalt~t
Vrate	1.0000													
sexv	0.0415	1.0000												
distancekm	-0.1678	0.0837	1.0000											
mstatus	-0.1628	-0.2162	-0.0209	1.0000										
agev	0.0699	0.1525	0.0451	0.1528	1.0000									
edv	-0.0741	-0.1992	0.0741	-0.0122	0.0507	1.0000								
job	0.0682	-0.0178	0.0045	0.1788	0.0093	-0.2015	1.0000							
orgntype	0.2610	-0.1452	-0.2132	0.0187	0.1565	0.0182	0.1418	1.0000						
income	-0.1252	0.1251	0.0187	0.1335	0.3044	-0.0825	0.1521	0.2115	1.0000					
team	-0.2827	-0.0481	-0.0230	0.0849	-0.0447	-0.0472	0.0794	-0.1604	0.0306	1.0000				
rseason	0.0254	-0.0491	-0.1144	0.1062	0.1278	0.0453	-0.1279	0.0128	0.1734	-0.1377	1.0000			
daysofprefe	0.0792	0.0213	0.1295	-0.0200	0.0977	0.0893	-0.1189	-0.0625	-0.0217	-0.1717	-0.0420	1.0000		
mtra	0.2983	0.0808	-0.1365	0.2010	0.2165	-0.0592	0.3417	0.1875	0.1144	-0.0112	0.0401	-0.0441	1.0000	
totaltripc~t	-0.1198	-0.0258	0.0217	-0.1013	-0.0735	-0.0359	-0.0550	0.0524	0.3093	0.0267	-0.0000	-0.0810	-0.0737	1.0000

Appendix: 1. B Summary statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
lnVrate	173	1.235535	.7572463	0	2.302585
sexv	173	.6820809	.4670196	0	1
distancekm	173	49.24855	16.75548	10	160
mstatus	173	.5144509	.5012419	0	1
agev	173	33.45087	8.720743	19	60
edv	173	.150289	.3583918	0	1
job	173	.3872832	.4885433	0	1
orgntype	173	.8208092	.5878869	0	2
income	173	18014.2	37776.74	200	250000
team	173	.9479769	.2227183	0	1
rseason	173	.6011561	.4910819	0	1
daysofprefe	173	.3236994	.469245	0	1
mtra	173	.5317919	.5004367	0	1
otaltripc~t	173	20174.76	107289.2	415	1130225

Appendix:1.C Regression results in five different count data models for ITCM

		C0efficients and Marginal effects											
Model		**PM (lin-lin)**		**NBM (Lin-lin)**		**TPM (Lin-lin)**		**TNBM (Lin-lin)**		**PM (L0g-lin)**		**NBM(log-lin)**	
Explanatory Variable	**Expected coefficient**	**Coef. (P>|z|)**	**Marginal effect**	**Coef. (P>|z|)**	**Marginal effect**	**Coef. (P>|z|)**	**Marginal effect**	**Coef. (P>|z|)**	**Marginal effect**	**Coef. (P>|z|)**	**Marginal effect**	**Coef. (P>|z|)**	**Marginal effect**
Sex		**-0.00072 (0.995)**	**-0.003**	0.0047 (0.967)	0.0193	-0.0016 (0.987)	-0.0062	0.0087 (0.945)	.03289	**0.0460 (0.297)**	**0.0525**	0.0459 (0.663)	0.0525
Distance (km)	-	**-0.0044 (0.1)***	**-0.018**	-.00471 (0.107)	-0.0196	-.0049 (0.107)*	-0.0193	-0.0059 (0.151)	-0.0225	**-0.0066 (0.038)****	**-0.0077**	-0.0066 (0.034)**	-0.0076
Marital status	+	**-0.286 (**0.003 **)****	-1.196	-0.2794 (0.005)**	-1.1693	-0.3123 (0.000)***	-1.2513	-0.3222 (2.09)*	-1.238	**-0.2026 (0.012)***	**-0.2344**	-0.2026 (0.030) **	-0.2345
Age	-	**0.0038 (**0.530**)**	0.0159	0.0040 (0.531)	0.0167	0.0043 (0.349)	0.01710	0.0050 (0.446)	0.0191	**.0006252 (0.626)**	**0.0007**	0.00063 (0.922)	0.00072
Education level	+	**-0.1722 (**0.209**)**	-0.675	-0.1569 (0.269)	-0.6181	-0.1816 (0.10)*	-0.6779	-0.1581 (0.446 0.303)	-0.5702	**-0.139397 (0.297)**	**-0.153**	-0.1394 (0.332)	-0.1530
Income	+	**3.48e^{-06} (0.010)***	-.00002	-3.77e-06 (0.006)	-.00002	-3.72e-06 (0.000)	-.0000145	-4.56e-^{06} (0.042)**	-0.00002	**-4.06e-06 (0.035)**	**-4.68e-06**	-4.06e-06 (0.033)**	4.68e-06
Team	+	**-0.4611 (0.010)*****	-2.377	-0.4696 (0.01)***	-2.4308	-0.4719 (0.005)**	-2.3372	0.4472 (o.o55)*	-2.401	**-.3202 (0.000)*****	**-0.4276**	-0.3202 (0.025)**	-0.4276
Transport mode	+	**0.4008 (0.000)*****	1.656	0.3908 (0.000)***	1.614	0.4385 (0.000)***	1.7314	-0.4989 (0.000)***	1.6933	**0.2419 (0.000)*****	**0.2773**	o.24199 (0.011)*	0.2821317
season	-	**0.0326 (0.750)**	0.135	0.0375 (0.719)	0.1553	0.0399 (0.622)	0.1579	0.058 (0.610)	0.2172	**0.0789 (0.505)**	**0.0902**	0.0789 (0.385)	0.0902
preferred days	-	**0.0940 (**0.335**)**	0.398	0.1019 (0.297)	0.4315	0.0989 (0.240)	0.40018	0.1186 (0.304)	0.4617	**0.1058 (0.490)**	**0.2821**	0.1058 (0.231)	0.1242
Total trip cost	-	**-9.18e^{-07} (0.000)*****	**-**3.82e^{-06}	-9.19e^{07} (0.000)***	-3.82e-^{06}	-1.93e-06 (0.158)	-7.68e-^{06}	-2.39e-^{06} (0.182)	-9.12e^{-06}	**-2.8e-06 (0.018)****	**2.430e-06**	-2.43e06 (0.018)**	2.80e-06
Job	-	**0.0369 (0.704)**	0.154	0.0365 (0.716)	0.1522	0.0493 (0.560)	0.1969	0.0562 (0.637)	0.2155	**0.0490 (0.352)**	**0.0568**	0.0491 (0.602)	0.0568
Orgn type	+	**0.2448 (0.004)****	1.0174	0.2379 (0.007)*	0.9889	0.2675(0.000)***	1.0628	0.2747 (0.007)*	1.046	**0.2449**	**0.124 2**	0.2449 (0.002)**	o.2773
constant		**1.7244 (0.000)*****	**NA**	1.7457 (0.000)***	NA	1.6896 (0.000)***	NA	1.6898 (0.000)***	NA	**0.5366 (0.000)**	**NA**	0.5367 (0.000)***	NA
				Alpha= .098435 Ho: alpha=0 Wald chi2(13)= *157.43* Prob> chi2 = 0.0000				**Likelihood-ratio test of alpha=0: chibar2(13) = *57.87*Prob>=chibar2 = 0.000**				**Alpha: 1.48e-11 Ho: alpha=0 Waldchi2(13)= *79.55* Prob> chi2= 0.000**	
Note: Values in the parenthesis are P-value, not Standard Errors													

Source: own computation **Where** ***1 percent level of significance**

Where: PM= Poisson model **** 5 percent level of significance**

NBM= Negative Binomial Model ***10 percent level of significance**

TPM=Truncated Poisson model

TNBM= Truncated Negative Binomial Model

Notice:1. *The statistical result of* ***PM(semi log) and NBM(semi-log)*** *are similar.*

2*. Here,* ***TNBM (Lin-lin)*** *and* ***TPM(lin-lin)*** *coefficient of Tc result is statistically insignificant. And* ***TNBM (Log-lin)*** *and* ***TPM(log-lin)*** *not applicable for the function of the* ***ITCM****.*

3. Dummy variables, travel cost, income and age of visitors are not in the logarithmic form. But, dependent variable (Vrate), is in the logarithmic form in the Log-linear function.

4. Econometric results of NBM (semi-log) and PM (semi-log) is similar.

Appendix.1.D. Comparative analysis between Seven count data models

variables							
Model	**PM(lin-lin)**	**NBM(lin-lin)**	**TPM(lin-lin)**	**TPM (semi-log)**	**TNBM (lin-lin)**	**PM (semi-log)**	**NMB(Semi-log)**
AIC	814.9831	804.512	*801.9312*	952.0762	783.0723	**442.8304**	442.8304
BIC	859.1292	851.8114	*846.0773*	994.9543	830.3716	**486.9764**	486.9764
Wald/LR chi2(13)	139.83	*157.43*	*112.68*	87.81	*57.87*	***79.55***	*79.55*
Prob> chi2	0.0000	0.0000	0.0000	0.0000	0.0000	**0.0000**	*0.0000*
Pseudo R2	0.1164	NA	*0.1271*	0.0866	*0.0714*	***0.0544***	*NA*

Appendix:1.E

```
. estat gof

Deviance goodness-of-fit =   86.2672
Prob > chi2(159)         =    1.0000

Pearson goodness-of-fit  =  64.19638
Prob > chi2(159)         =    1.0000
```

Appendix:1.FMulticollinearity test(vif test)

```
. vif
    Variable |       VIF       1/VIF
-------------+----------------------
      income |      1.44    0.693684
         job |      1.30    0.766774
        mtra |      1.28    0.781457
        agev |      1.27    0.787183
    orgntype |      1.26    0.795598
        sexv |      1.25    0.799464
     mstatus |      1.21    0.829147
totaltripc~t |      1.20    0.833693
     rseason |      1.14    0.876626
distancekm   |      1.13    0.888255
         edv |      1.12    0.893450
        team |      1.12    0.893453
 daysofprefe |      1.09    0.916674
-------------+----------------------
    Mean VIF |      1.22
```

ADDIS ABABA UNIVERSITY

College of Business and Economics

Department of Economics

Questionnaires

This questionnaire paper is prepared by Addis Ababa University, College of Business & Economics, and Economics department graduate student for collection of data for conducting thesis for partial fulfillment of requirement for Masters Degree in Economics. The main purpose of this questionnaire is solely academic purpose, (i.e. to gather data on the ***Economic valuation of the recreational use value of Babogayya Lake (Bishoftu town): By Travel cost Method***).

Your genuine & honest response for every question has a great role for the successfully completion of the study and it's appropriateness for research results (findings) and recommendation provided to policy makers make conscious decisions about the site/town. Some questions are designed to draw some historical information from your experience; and some will require your attitudes and opinion. There is no "right" or "wrong" answers. I would like to assure you that, all your answers will be treated in strict confidence and hence, please give us your response as genuinely as possible for each question below.

I would like to thank you in* advance *for your cooperation and willingness to share your best knowledge.

The researcher

DEMOGRAPHY OF RESPONDENTS

Respondent name: _____

Date: _____

Interview started time: _____

This is not applicable for Respondents: Jump over it.

Interviewer code: _____

Interviewee number: _____

*Supervisor:*_____

Fill the following box by choosing right answer (✓)

1. **Sex**: male ☐ Female☐
2. **How much is your Age**? _____
3. Marital status: Single ☐ Married ☐ Divorced ☐ Widowed ☐
4. What is your Family size? _____
5. **Educational status:**

   ≤ 8grade ☐ Secondary School (9&10) ☐ Preparatory/TVET school ☐

   University student ☐ Diploma ☐ BA/BSC MA ☐

   PH.D and Above ☐

6. **Citizenships**

   Foreigner ☐ Ethiopian ☐

7. **What is current job?**

   Investor ☐ Business man ☐ Resident/Retired ☐ worker ☐

   Other specify: _____

8. If you are worker in which institution now, you are employed?

Government organization ☐ Private ☐ Own Business ☐ Student ☐

NGO ☐

PART-I

1. Place of Residence: (**Only** ***applicable for Ethiopians)***

1. If you Ethiopian, your current Residence:

   Region: _____

   City/town: _____

2. How many kilometers is your residence from Bishoftu recreation sites? _____ **Kms**.
3. How many minutes your residences take from Bishoftu town recreation sites? _____ **minutes**

(Only ***applicable for Foreigners)***

4. If you were foreigner: Your Country/state:

   American States ☐ European countries ☐

   South-Eastern Asian Countries ☐ Arab states ☐

5. Is touring/visiting is your primary purpose for coming Ethiopia?

   Yes ☐ No ☐

2. Income sources.

6. Are you the head of the household? Yes ☐ No ☐

Net income: what is your own net income?

From: a. Employment _____ Birr per (month)

b. Business _____ Birr per (month)

c. Other sources _____Birr per (month) (e.g. House rent, Bank interest, including pocket money from parents, relatives, friends, Remittances etc)

Please specify_____ (per month)

7. How many people in your family (including yourself) earn their own income? (Either from employment or business, etc)--------)(***Not applicable if Household head is the only source of income for family)***

   Please list family income (monthly)

   Income from business _____birr per (month)

   Income from Employment _____birr per (month)

   Income from other sources (please Specify) _____

PART II

<u>Respondents' opinion on the site & their visitations</u>

The purpose of the following questions is to know respondents attitude towards Bishoftu town recreation sites, which will be useful to gather historical data about your visitation.

1. For How many years you know Bishoftu town recreational sites? _____Year
2. Are you come to Bishoftu town recreation sites before this year for purpose of recreation**?** Yes ☐ No ☐
3. How many times have you been visited at Bishoftu town recreation sites? _____ **Times.**
4. Have you recreation plan per year at these recreation sites?

   Yes ☐ No ☐ If your answer is yes, How many times per year?_____

5. How many trips did you plan to take to the Bishoftu town recreation sites during the last 12 months? ----------**trips**.

6. How many recreation trips to the Bishoftu town recreation sites did you take during the last 12 months? **----------trips.**

7. Is there a difference between the number of trips you planned to take to Bishoftu town recreation site and the actual trips you took during the last 12 months? Yes ☐ No ☐

8. If the answer for No.7 is yes; what do you think the cause of this difference?(**circle your choice**)

   A. Due to income constraint

   B. Due to preference of other similar sites

   C. Due to leisure time constraint

   D. Fear of Traffic problem

   E. Due to remoteness of the site

   F. Due to deterioration of services at this site

   G. Busy due to different responsibility (e.g. work)

   H. Other reasons (please specify) _____

9. Do you think that you would take more trips in the next 12 months than the trips you took before to Bishoftu town recreation site? Yes ☐ No ☐

10. If you answered yes to question **no, 9**; how many more trips would you plan to take to Bishoftu town recreation sites in the next 12 months? ____**more trips.**

11. How many minutes do you usually stay or want to stay on Bishoftu town recreational sites? _____**Minutes.**

12. Most of time how do you come to these sites alone or in-group?

Alone ☐ In-group ☐

If you came in group: How many people are in your group**? ----------People**

13. What is your relationship with whom you usually come to these sites? Friends

Wife ☐ Husband ☐ Families ☐

Relatives ☐ Other (Specify):_____

14. In which seasons/ months do usually prefer for Recreation purposes?

- ♣ Summery (kiremt): June, July and August ☐
- ♣ Autumn (Tsedey): September, October& November ☐
- ♣ Winter (bega): December, January and February ☐
- ♣ Spring (Belg): March, April & May ☐

15. Which days do you frequently prefer /use for Recreation purpose?

☐ Working days (Monday – Friday)

☐ Weekends (Saturday &Sunday)

☐ Public holidays

3. OPPORTUNITY COST OF TIME

16. Do have monthly income source/s? Yes ☐ No ☐

17. If your answer to **No:16,**is **yes**, How much is your daily income/wage rate:

From: Employment: _____

Business: _____

Donation (family, relative, friends, rent, remittances):_____

Other specify: _____

18. Today, if you were not on this trip, what type of work you most likely do?

a. Payable Work (Employment; per day worker, own business, etc)

b. Non-payable Work (Housework, Learning Activities ,etc)

c. Other specify_____

19. If your activities is payable, how much birr you can earn?_____ birr per day.

20. Please rank your enjoyment/preferences on the following recreation activities in Bishoftu town recreation sites.(by percent)

A. Swimming in the lake ----------

B. Enjoyment from beautiful weather, scenery of the lake & landscape_____

C. Outdoor games facilities ----------

D. Boating ----------

E. Bird watching & photographing ----------

F. Parking_____

4. MONEY EXPENDITURE

21. Which mode of transport did you use to & from Bishoftu town recreation site? (Please tick the mode of transport you usually used)

☐ Own vehicle/ private car

☐ Public transport

☐ Other travel agents' vehicle

Others (please specify)_____

22. On average, how much is the amount of cost of transportation; including cost of **fuel or tariff** per round trip?

a. Journey to and from the Bishoftu town recreational site----------birr

23. To enter this recreational site (entrance fee), how much birr did you pay? _____

24. On average, how many birr usually you spend at recreation Bishoftu town recreational sites? 1. Recreation on the sites (food, drinks, entertainment, equipments) ---------birr

25. On Average, what are your total recreational cost Bishoftu town recreational sites? _____**Birr**.

26. For your Current trip, if you were asked to choose one of the following sites, which site do you prefer? (i. e. which site would be your first choice?)

1. Kuriftu Resort ☐ 5. Babugaya Resort ☐

2. Adulala Resort ☐ 6. Hora Resort ☐

3. Liesak Resort ☐ 7. Salayit Resort ☐

4. Etalem Resort ☐ others (specify) _____

Why,_____

27. In general what are the challenges/difficulties that you face as tourist at Bishoftu town recreational sites?

_____
_____

If you have comment:

_____
_____
_____

Interview ended time: _____

Thank you!

For giving me your special and golden time.

Detail Description of Study site

What are factors that made Bishoftu town one of the best tourist destination towns in the Oromia regional state?

Oromia is a region of great physiographic diversity. Oromia is endowed with varied relief features which in turn accentuate varied and amiable climatic condition and other rich natural resource like lakes (both rift valley and Crater), large rivers, mountains (Mt. Batu (4607 m) - the highest peak of the region), lakes, Dams and etc. Oromia has many large and small towns which have high potential for tourist attraction. For instance Jimma (Abba Jifar palace),Adama(Abba Gada Hall),Harar(Harar city wall and the Hyena Man),Nakemte(Wollega museum, Kumsa Moroda palace and Sorga Lake) Ambo(wenchi crater lake),Bale Robe(Sof- Omar Cave, Bale mountain lakes & Dire Sheik Hussein Mosque,),Assela(Chilalo Mountain, Langano lakes, Sodere hot springs),Ilu Abba bora(Bedele)(River Sori falls,Abba Bora halls),Bishoftu(Seven crtater lakes, City of Lakes, Abba Gada Halls),Shambu (Oda Buluk,Finchaa lake,River,Dam and Gorges) etc.

Bishoftu town is one of ancient towns of Oromia Regional state, those posses numerous natural beauty like crater lakes situated throughout the town with beautiful scenery of mountains chain (topography) to welcome tourists and which are the best opportunities to develop different tourism activities in the town. Natural beauty and topography of the town with availability of lakes make it different town.

History of Bishoftu Town

Bishoftu town is one of the oldest town and currently becoming one of the known tourist destination town in Oromia regional state and Ethiopia as well. It is located in the Eastern Shewa Zone of the Oromia Regional State, and has an elevation of 1,920 meters (6,300 ft). It

is located 47.9 kilometers (29.8 mi) at South East of Finfine or Addis Ababa along its route four high ways and capital town of Adea district/woreda. It has had telephone service since 1954.The town has nine kebeles, and an estimated total population of more than 136, 000 (66,677 male and 69,395 female), was founded in 1917 when the Ethio-Djibouti Railway was established.

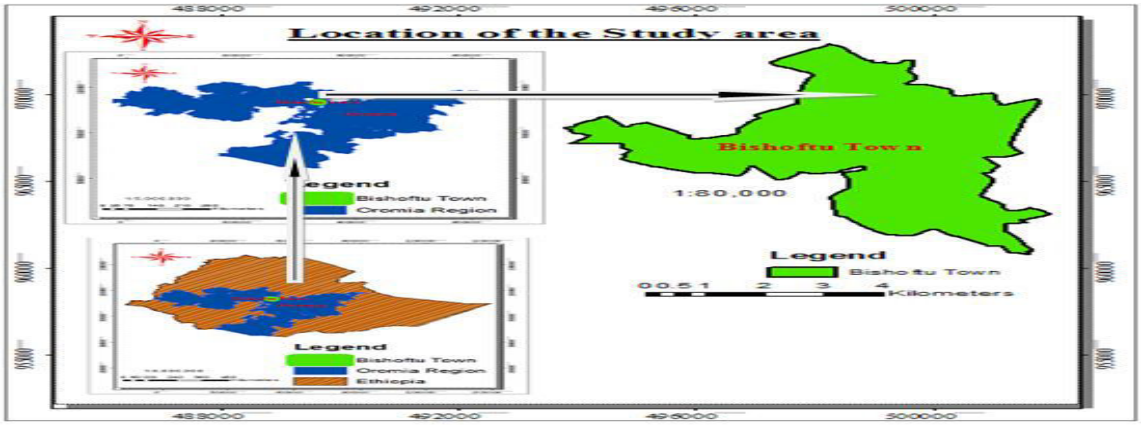
The term Bishoftu is derived from the Afan Oromo language *"Bishaanoftuu"* which refers to *"the land of excess to water body from Natural crater lakes"*. The town blessed with magnificent natural beauty and located relatively close to the capital city, Addis Ababa and is known for its Seven(7) crater lakes such as Lake of Bishoftu, Lake of Hora Harsadi, Lake of Cheleleka, Lake of Kuriftu, Lake of Kilole, Lake of Megerisa(Green) and Lake of Babogaya(Lake of Bishoftu Guddo). Hence, Bishoftu is usually recalled as *"City of Lakes."* The natural topography of Bishoftu town is characterized in the north and east by flat land locked by swampy lakes. In the south and west, the land is dominated by rolling hills. The altitude of the town ranges from 1900-1995 meters above sea level. Its average temperature and annual rainfall are 27^{o}c and 746.6 mm respectively. May is the hottest month of the year, while November is the coldest month in the town. February and August are the driest and most rainy months of the year in the town, with 0 mm and 241 mm of rainfall, respectively.

The city administration works strongly to make the town a best tourist center within the country and in the Horn of Africa. As part of the garden city program, the city has constructed guesthouses, high quality lodges and recreational sites. Bishoftu offers different types of accommodation, including hotels, resorts, lodges and recreation centers. The seven major lakes serve as both natural and cultural tourist attraction sites. In Bishoftu town, there is "Hora Harsadi", a remarkable "Waqeffata" praying area, where the "Irrecha Ceremony" takes place. This is the most famous cultural site in Bishoftu and in the greater region as well.

The ceremony is conducted once a year in September on the first Sunday following the Meskel holiday. Other cultural facilities include a museum and a public library.

It is the home of the Ethiopian Air force, Defense University Collage, And National Veterinary institute and Bishoftu Agricultural research center, More than four steel factories, floriculture farms, garment factories, genesis farm, Bishoftu Technical High School was established in 1958, Bishoftu Meserete Christos College, a Christian college owned by the Meserete Kistos Church, Kuriftu Kalehiwot Christian Church and many other privately owned institutions are also located in the town. Despite the city's status as a district for several decades, Bishoftu is physically larger than most Zonal capitals in the country. For instance currently; it is next to Adama in regional state of Oromia as an industrial city of economic significance. And it is labeled as a center of tourism both at national and regional level.

Figure 3.1 Map of the Study Area



4.2.1 Natural tourism resources of Bishoftu

4.2.1.1 Lakes

A. Lake Bishoftu

Lake Bishoftu is located on the southern side of the town and road from Addis Ababa to Adama. The town also named with name of this lake. It is the deepest lake among the lakes

found through the town. Though the lake is surrounded by bare hills, but still it got magnificent view and breathtaking weather. There are some hotel and resorts around the lake and a private lodge is now under construction at shore of the lake. This Lake is rich in fish population and it may have potential for fishing sport and boat riding tourism activities but now day none of these activities are taking place on this lake.



Source: Field survey, (2014)

B. Lake Hora Harsadi

The cone shaped Lake Hora is the second largest lake which is situated just at 2 km north from the center of the town. It has beautiful landscape with easy access in every direction and is good for bird watching. Bird species like Storrs, Pelicans, Shovellers and Grebes as well as brightly colored King Fish are easily observable. The Lake is surrounded by endemic plants. Such as *junipers procera* , *Podocarpus alcatus* , *Eucalyptus* spp , *Ficus* spp , *Acacia* spp , Cordial Africana and, *Spathodea nilotica* (Meselu, 2010 cited in Hiwot, 2013). This lake has great value among Oromo people because of importance as a center for the celebration of *Irrecha* ceremony; Oromo ritual holiday. Lake Hora Harsade in Bishoftu is the most widely respected location of this celebration even though Irrecha is celebrated throughout the country at different locations. Though the lake has the potential for various water activities like fishing sport, beach bally ball and other, the traditional boat riding service had started and now day nothing is there. According to FGDs result conducted around here with local

community the people who had started boat riding service on the lake were restricted by the town administration because of the place demanded to private tourism service providers' investors and conflict from people working on Gada and cultures to secure the place of Irrecha, but it is possible to provide this people with other side of the lake to continue their job instead of completely avoiding them to do. They stated that they town administration only encouraging private tourism businesses.

C. Lake Babogayya

Lake Babogayya which is also called "Bishoftu Gudo" which means 'Large' is located to the northern side of the town. It is the first preference of every tourist because of its scenic beauty, possession of diverse plants, availability of reasonably priced recreational activities (swimming, fishing, and boating) and standard hotel and resorts are around here. It is the most utilized and degraded one due to the destruction and encroachments of the vegetation for the construction of resorts and the community for fire wood. The two micro businesses which organized by the local community, boating and swimming recreation centers are founded on this lake. As per information results from the focus group discussion held with local communities living around this lake some of them are involved in boat riding, swimming and tour guiding comparably with low price than private tourism businesses in the area. They also stated that as they have a good relationship with hotel and resorts and lodges serving tourists on the lake. They helping them to guide their guests want to visit surrounding areas. Some of them also are providing them with meal products like vegetables, eggs, chicken, fish, cereals, etc.

Figure 4.3 Babogayya Lake



Source: Field survey (2014)

D. Lake Cheleklaka

Lake Cheleklaka, which is located on the north west of the town, is seasonal lake which is believed as it was formed by flood (Sisay, 2010 cited in Hiwot, 2013). It known as the seasonal lake because it amount is seasonally fluctuating. This lake is home of birds for both seasonal and permanent species', especially those migratory species from Middle East countries. So lake is ideal for bird watching, because it's known by birds' population among the lakes around Bishoftu. The major types of birds include; Flamingos, European cranes, geese, ducks, hammer cops and other various kinds' of birds are easily observed here (Anonymous, 2009). This lake is more used for agricultural purpose than tourism activity and it may a great potential to develop agro-tourism in the area. It has a very impressive view surrounded by large agricultural farms. At the same time the lake and its marine areas are extremely polluted.



Source: Field survey of 2014

E. Lake Kuriftu

Lake Kuriftu, the smallest and the less deep of all the Lakes, is located at 2km east of Lake Hora Arsedi and nearby the south east of Lake Babogaya; it is among one of the four lakes that are found in the 4m radius (Hora, Babogayya, kuriftu and Bishoftu). Kuriftu is believed to be formed by flood and diverting Wedecha River for irrigation purpose. This Lake is characterized by its pure water and availability of modern boat service. The surrounding areas are dominantly occupied by religious institutions and by Kuriftu resort and spa.



Source: Field survey of (2014)

F. Green Lake

Green Lake which is surrounded by a chain of mountains with magnificent view is located at 5km in the south side of the town just behind the Air Force base. It acquires the name because of its color occurred as a result of the Green Algae found in it. It can be a good potential for trekking tourism activities. The chain mountains surrounded this lake has naturally formed caves. This cave has different compartments and has used as shelter for nuns and monks in past times (Hiwot, 2013). Similar with Lake Hora but, for small amount of the local community the lake has important value by being place to celebrate ritual ceremony of Irreechaa. No tourist infrastructure is available here sometimes tourists are visiting by walking from nearby hotel and resorts around lake Bishoftu.



Source: Field survey, 2014

G. Lake Hora kiloole

Lake Kiloole is located at10 km hard drive north east of the town; This Lake is rich in bird species, especially birds like water fowls, African fish eagles, cormorants, Egyptian geese, ducks, plovers etc. (Anonymous, 2009). This lake only serves as a source of water for the local community living around there. The water level is decreasing extremely because the main tributaries are diverted for irrigation purpose on their ways. It is exclusively used for agricultural purpose and ploughing is taking place up to the very shore of the lake. There is no tourist infrastructure is available.



Source: (BCTO, 2014)

4.2.1.2 Mountains

The chained mountains of Yerer and Zukuala that surrounded Bishoftu at the north east and west coupled with hills of Babogayya, Gara Beru , Bishoftu and Sofa increase the scenic beauty of the Town to welcome tourist. Mount. yerer which is located north of Bishoftu is

well known for the church of Holly Trinity and Ba'ata monastery. The mountain offers pleasant atmosphere of the high altitude forest habitat with endemic faunas. It is suitable for camping and for trekking on foot or on animal back. In addition the Mountain is home for several manmade and natural caves; one of the incredible thing found in the cave is the dead body of monk Abba Sale Marian with his cross which is not decayed (BCTO,2012). Currently the skeleton is found in Trinity Monastery. Mount Chuqala (Ziquala) is situated west of Bishoftu and is rich in natural forests. The monastery and holy water found on its top are the major cause of regular visit of domestic tourists. Figure Mt. Yerer



Source: (BCTO, 2014)

4.2.2 Cultural Resources

In addition to the above mentioned natural resources, Bishoftu is also endowed with plenty of cultural resources with great potential of attracting tourists and enhancing economic and socio-cultural status of the local community in particular and the economy of the country in general. But still they are not using for tourism purposes. These places of interest include Irrecha, Lema Guya art museum, Palace of Emperor Hilesilasse and Bishoftu Museum.

1. Irrecha ceremony

Irrecha, thanks giving worship and pray for God (waaqaa) near Lake Hora Harsadi in the beginning of new season autumn is celebrated on the first Sunday that come after the celebration of Meskel Festival (the finding of true cross) and the consecutive days of that week. It's one of the distinct thanksgiving celebrations in the traditional religion of the Oromo's (Waaqeffannaa) is called "Irreechaa" or "Irreessaa," which, by itself, means thanksgiving. The Oromo people celebrate it in the season of 'Birra', when the flowers bloom and life flourishes. And also the gloomy summer passes away. It has a great contribution for tourism development, especially in case of Bishoftu, Hora Harsadi is where it celebration ceremony takes place in a mass number of people. It enables the town to get a number of tourists who comes from different parts of the country as well as overseas tourists. The majority of people will come from whole directions of Oromia Regional state for the purpose of Irrecha festival celebration. This kind of festival can built the image of the site; even the tourists who come to the town in any time are like to visit the place of Irrecha and including other attractions of Bishoftu town. In case of visiting this event and areas the tourists are looking for foods, overnight stay places (resorts, hotels, lodges and pensions), recreation as well as they like to experience the cultures of the community. While they are doing these activities they invest their money and its can be a good opportunities for the local people by creating short term employment and to the local service providers to enjoy the high profits. Also it can create seasonal market opportunities for the local handcrafts makers and souvenir shops, which produce and sell cultural materials for tourists. And it brings additional money to the area. According to key informants from hotels and other tourist services providers, they said that during Irrecha celebration they get full occupancy and a numbers of customers and they enjoy a large amount of benefits/profits. According to the focus group discussions results Irrecha is the best traditional religious festival which attracting many tourists within

and across the country to Bishoftu town and during its celebrations local communities can involve in serving the attendants/tourists with food, lodging, selling handcrafts, cultural show and other entertainments. As a result the can enjoy a good profit.




Source: (BCTO, 2013 and 2014)

2. **Bishoftu Museum**

Bishoftu museum which is currently established is home to a different cultural collection of each zone in Oromia regional state started exhibiting services for tourist. It has different show rooms each represents one zone of cultural collection in each Oromia region. It has the collection of different cultural equipments used for various purposes (war, weeding, dispute solving, time pass, farming materials, cultural clothes, materials, furniture, etc.) from all over the region. It giving a chance for tourists to experience little Oromia cultures shortly in one place and has a great role in the diversification of tourism activity in the town.

3. Lemma Guyya Art Museum

This gallery is owned and managed by Artist Lemma Guyya which was established in 1984.All the collections found in the gallery are the work of the artist and his sons and daughters. The unique features of these paintings are almost all are painted on the hide and skin of animal. There are four show rooms with different picture collections. Cultural dressing style of the nation and nationalities, especially Oromo clan, picture of Ethiopian

athletes, the ancient and recent leaders of Ethiopia and abstract work of his family are some of the paintings exhibiting for tourists and very interesting one.



Source: Field survey of (2014)

Other attractions in the town worth to mention are; urban agriculture and flower seedling sites which could be used as agro tourism resources, Potential for rural tourism, Tekalegn cave which was made by one of Ethiopian patriot during Italian occupation and used as shelter for both Ethiopian and Italians at different times, and historical war sites like Shimbra Kure (between Gragn Ahmed and Christian king or Atse Libne Dengel) and Shimbra Meda with fascist Italy (personal observation). Beside this cornerstone has founded for the formation of Hora Park and the man-made zoo when this thing is over it can be a great means of tourist attraction.




Indicators of high demand for Recreational activities in Bishoftu Town

I. Construction of the Palace of Emperor Haile Silasse (Fair field)

The palace, which was referred as the second home of the Emperor was founded in 1943 during the reign of Emperor Haile Silasse. The Emperor used it as "***recreational site"*** and built a palace in the town, named "Fairfield" after his wartime home in exile in the town of Bath, England. It is a ground plus one building on the eastern shore of Lake of Hora Harsadi; also has underground ways that directly connect with the Lake. The architectural design of the building was taken from England which represents the house where the emperor was lived in during his exile and named it after Fair field Palace. It has different rooms used for different purpose like bedroom, dining room, office, guest room, kitchen, tax room, *chilot bota* (Place where the emperor used to give solution/judgment for complaints raised by the local community) and other. There are different equipments in the palace (bed, gifts, chair etc) that had been used by the emperor and his families. Some of them are taken by Derge and the remaining are still found in the palace (Ato Mezgebu, personal communication, March, 2014). Because of lack of awareness among local community and less effort of BCTO to owe it, still this palace is serving as bedroom for Bishoftu Air Force hospital.



Source: BCTO, 2014

II. The history of the Ethiopian air force is tightly woven with the history of Bishoftu. In 1946, the beginnings of what would become the Ethiopian Air Force was moved from the Bole Air port in Addis Ababa, which was needed by Ethiopian Air lines to Bishoftu for purpose training of pilots. Because they liked the Natural beauty and good topography for training of armed pilots.

III. The Gafat Armament Engineering complex was also established according to that period political situation for and Bishoftu town is also preferably selected due to it ids near to Finfine (Addis Ababa) and Natural beauty and suitable topography for training armed forces.

IV. Ethiopian Instutitute of Agricultural Research also established its branch Bishoftu Research center since 1953 because of good climatic conditions and availability of water sources from lakes for agricultural production and researches.

V. There are also bright hopes for future as Bishoftu town is to be selected as one of the best destination by predicting from current large tourism investments activities like where many big both private hotels and resorts are under construction at both national and international standards.

VI. Not only government institutions but also many private domestic and international institutions are available.