ADDIS ABABA UNIVERSITY

SCHOOL OF GRADUATE STUDIES

MEASURING ECONOMIC VALUE OF TIS ABAY WATER FALLS: COMPARISON OF CONTINGENT VALUATION AND TRAVEL COST METHODS

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A thesis submitted to the School of Graduate Studies, Addis Ababa University, in partial fulfilment of the requirements for the Master of Science in Economics (Economic Policy Analysis).

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Abstract

One aspect of sustainable development is the need to retain an "acceptable" level of environmental quality and to conserve nature's assets. Environmental economics literature has therefore developed to encompass a range of monetary valuation methods and techniques designed to value the spectrum of environmental goods and services. The task of monetary valuation of the environment is made more complex by a number of problems. These include the fact that often environmental effects will have no natural units of measurement, and even where physical indices are available these must be related to individual perceptions. Besides, due to their externality and public good characteristics environmental effects do not often directly show up in markets.

Extensive use of monetary valuation methods combined with technical improvements in techniques have resulted a large literature that consists a wide range of valuation case studies. There is now a wide range of application of the contingent valuation method (CVM) in developing countries. Most of the studies are concerned with fresh water investments and sanitation. However, there are fewer studies that look at forest values, outdoor recreation, sanctuaries and parks. Of course, few limited studies have applied different techniques in valuing different environmental resources. This indicates that both in developed and developing countries more emphasis has been given to the reliability of contingent valuation method (CVM) . This study has attempted to estimate recreation value of Tis Abay Water Falls which is considered nature based tourist attraction area by applying contingent valuation method (CVM) and the travel cost approach(TCM) and evaluated the extent whether different techniques for valuing a given environmental charge will produce similar results.

The conflicting interest around Tis Abay Water Falls resource is the background for this study. Tis Abay II Hydro Power Project is being implemented with the objective of increasing the supply of energy, where as the Tourism Master Plan proposed establishment of Tis Abay national park to enhance tourism industry. However, there is a trade-off between these two proposals, because the implementation of Hydro – electric power project will necessarily involve a significant reduction in the flow of water falls and that may not sustain their aquatic diversity and value of tourism.

Though, there is significant difference, both methods have come with substantial consumers' surplus of Tis Abay Wate Falls Park which shows high potential tourism value of the resource . This might help to consider environmental policy issues and the need for the simultaneous pursuit of multifarious development objectives which are often in conflict with each other.

1.Introduction

1.1. General Background

1.1.1 Environmental Resource Preservation and Development

Nowadays environmental economics literature has developed to include a wide range of environmental issues such as sustainable development, options for development or preservation, trade-offs between alternative resource uses etc. The concept of sustainability carries several meanings, which provoke or instigate current debate. Regarding environmental resources a crucial point for economists is choices between development and preservation. The choice between these two alternatives depend upon issues like irreversibility, ecosystem complexity and substitutability. The achievement of making proper choices might remain the greatest challenge facing scholars who pursue their studies in the area..

For sustainable development there is a general proposition for environmental quality and natural resource augmentation to be necessary conditions. The challenge of sustainable development is how to meet immediate needs while at the same time preserving the resources for the next generation. Environmental economics has its domain of interest in the relationship between the workings of an economic system and the set of natural resources that support the economic system by supplying inputs such as minerals, forest products, soil quality and water. The environment's capability to receive, degrade and recycle the waste products flowing to it from the economy is an important natural resource. So, is the stock of germ plasm or "biodiversity" , as an object of economic value for use of

mankind, as an object of value in itself and as a means of providing resilience' to exogenous change - stability through diversity (Pearce, Barbier and Markandya ,1988).

Even though "sustainability" has become the main concern for much of the recent works in environmental economics, there still remains considerable disagreement both on the conceptual and operational context of the term. This disagreement has emanated from various sources, including differences in disciplinary perspective, the axiomatic foundations of the dynamic models within which the concept has been explored, and the interpretation of sustainability at the policy level. Moreover, underlying many of the disputed issues one finds ill-defined set of philosophical and ethical differences over the problem of both intra and inter-generational equity (Common and Perrings, 1992). The arguments for conservation of natural habitats and the protection of biological diversity are also important for sustainable development.

Biodiversity includes a wide variety of genetically distinct populations and species of plants, animals, and micro organisms with which homosapiens share the earth and the variety of the ecosystems . One of the problems facing ecologists and economists today is how to measure the value of environmental goods whose destruction generates vast externalities from an economic perspective, the problem with biodiversity loss lies in the fact that a change in the mix of species - biodiversity - implies a change in the value of those assets in which human production, indeed human survival depends (Githinji and Perrings, 1993).

Today, the fundamental question on the compatibility of development and environmental objectives, on the nature of trade off and choice have become evident when trying to satisfy both simultaneously. What emerges from the discussion on this issue is that there is no one set of trade offs or choices available to policy makers just as there are a wide range of development objectives and strategies being pursued by countries around the world. There are many legitimate debates about the ways to value and manage the environment. Therefore, it comes as no surprise that there is no consensus reached on how development and environmental objectives are best looked and accommodated in the development process.

Irreversibility is one major criterion to choose between the two alternative uses of environment; preservation or development. To estimate the benefit of development or preservation, irreversibility is a crucial point and emphasizes on the value of information and on uncertainty. Regarding irreversible development a number of contributions are made by many economists.

Krutilla and Fisher (1975, 1985) have developed an approach to irreversible development which recognizes asymmetric growth rate for development and preservation benefits. But, Hanley and Spash (1985) argue that, there are a number of problems in this approach, namely; growth rate and interest rate can be difficult to estimate and may be unstable over time , the initial values for preservation and development can be difficult to measure, and future preservation benefits foregone are measured using the preference of current individuals which may conflict with the future preference.

Fisher, Krutilla and Cicchetti (FKC)(1972) have shown that if preservation benefits are increasing relative to development benefits, and if development is irreversible, then the optimal amount of preservation may not only become positive, but also greater than would be indicated by current valuations. They also show that FKC's conclusion that the optimal development is less than would be indicated by a purely myopic analysis holds under more general circumstances than they analyzed. On the other hand, Barret (1989) has presented a more general model of optimal economic growth and environmental preservation in which the results of FKC emerge as special cases. Accordingly, FKC's more general results serve to support the case for preservation (Barret ,1989).

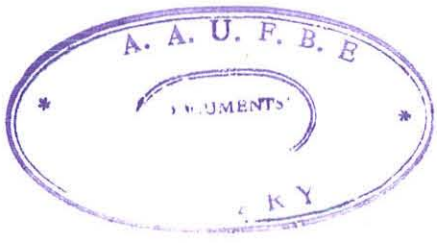
Another line of economic thinking on irreversible changes was pursued by Arrow and Fisher (1974). They have tried to explore the implications of uncertainties surrounding estimation of environmental costs of some economic activities. They argue that the existence of uncertainty will, in certain important cases, lead to a reduction in the net benefits from an activity with environmental costs.

Arrow and Fisher have advanced the concept of a "quasi-option value" when making a decision to prevent an irreversible development. Quasi-Option Value is most easily understood in a two periods model. They have shown that, so long as there is a non-zero probability of new information becoming available, then a positive quasi-option value arises for the alternative of avoiding an irreversible development, and raises the opportunity costs of development.

According to Pethig (1991), Quasi-Option Value is an inseparable element of preservation benefits and a good decision about irreversibilities can not be reached unless the best possible use of all available information is made. He argued that, the optional procedure may be a strategy of sequential postponing of the decision to destroy a resource until new information becomes available.

It is widely believed that wild life parks or sanctuaries are important for the conservation of some components of biodiversity. In addressing park issues there are biological, scientific, medical, socio-cultural, emotional and job related benefits that the wildlands can provide. National Parks and reserves represent the single most important method of conserving biological diversity world wide. These protected areas conserve many of the worlds habitats and species. Yet human encroachment, especially in tropics, is severely degrading and destroying many of these areas.(Brandon and Wells, 1992)

Preservation of the ecosystems and making continue to generate natural recreation highly affected by human activities and attitudes. Human existence, sustainability and development are directly and indirectly dependent upon the preservation of biodiversity. A common argument for protecting a reserve is that it will provide benefits in the future. However, the option of "preserving" the natural habitats as natural reserves seems not feasible. In the conservation of biodiversity, trade-offs are inevitable. For any resource committed to conservation there are alternative uses..



It was argued that trade -offs are a fact of life. We face them in every aspect of our existence, from where we live to what we do for a living. Sometimes we make choices fully aware of what the trade- offs may imply but more often we are forced to choose in the dark. The more complex the content of our choice, the more often we must choose among options with incomplete knowledge of the final outcomes. In these cases, we can be surprised by the consequence of our action. (Cangelosi ,1992)

How should society reconcile its desire for both development and preservation of natural environments?This poses a question in our mind to reflect on the condition of Tis Issat water falls recreation area where there is a recognized potential conflict between development and environmental objectives. Preservation of Tis Issat water fall as recreation or the development of national park around the area which guarantees the natural elements not to disappear in the future. However, preservation has a cost. The opportunity costs of preserving a park, are the benefits that are lost because of operation or the existence of the preservation. Therefore, a careful economic assessment of preservation versus development is required. In cases where preservation benefits are increasing relative to development benefits, and the development is irreversible, then the challenge to ensure the capacity of the ecosystems to continue will be more complex. So one area of interest in the study is to evaluate the attempt that has been made to link development and environmental issues concerning Tis Abay Water Fall resource.

1.1.2 Resources and Economy of Tis Abay Water Falls

Ethiopia's scenery ranks among the most beautiful in Africa and is full of variety offering mountain ranges, high plateaus, deep canyons, large savannas, deserts, volcanic craters, long rivers including the Blue Nile, water falls, the lowest depression on Earth (Dallol), the largest cave in Africa (Sof Omar), the Great Rift Valley and its numerous lakes, hot water springs, and Lake Tana, the source of the Blue Nile. (Tourism Commission, 1993). It was noted that,the state of Ethiopia's natural or man made tourist attractions has been a cause for alarm for many years . Tis Abay Water Falls, which is one of natural tourist attractions of the country, is no exception.

Tis Issat Falls is one of Ethiopia's most impressive natural spectacles and a national land mark. It completes the historic route prestigious sites of Gonder, Lalibela, and Axum. The fall is located 35 km south of Bahir Dar near the village of Tis Issat. The sudden plunge of the Nile into 40 meters depth creats the spray of waters, and the mist, which drenches the wide area of the slope facing the water falls. The falls have a width of about 400 meters. After sheer dropping of the Blue Nile River then starts its course through a depth of 70 meters narrow gorge. When the flow is sufficient it produces a spray of water (the famous "Smoke") forming a persistent rainbow. The morning tour awards the visitors with surprising natural display of rainbows which shimmer across the water falls (ANRS,1999)

From the parking area, it takes an hour on foot on a somewhat difficult path to reach the falls. A stone bridge built by the Portuguese three centuries ago, which is still in use, is an

important attraction for visitors. It serves as a pass to cross a rift on the way to the falls, adding pleasure to the excursion. The site over looking the falls is a mere intended earth surface that can be dangerous to tourists (MWR, 1998).

Tis Issat Falls is one of the country's most impressive natural spectacles, Scottish traveler James Bruce wrote the falls were "a magnificent sight that ages, adds to the great length of human life, would not efface or eradicate from my memory" (MWR, 1998). The historic Fassil bridge accross the river Abay below the falls is an added attraction for visitors to the area. Bahir Dar is the base for visiting the Tis Abay water falls and also the starting point for exploration of Lake Tana's island monasteries.

The number of domestic and international visitors who visited Tis Abay Water Falls has increased over the years. International tourists inflow to the area shows a marked seasonal distribution mainly reaching its peak between the months of October and March. Domestic tourism on the other hand, is by far less seasonal. Indeed, nearly exactly half of the domestic visits are made in the six months of the international tourists high season (MWR,1998).

Tourists visiting the falls stay in the near by town of Bahir Dar on the shores of Lake Tana. Tourists visiting the Tis Abay Water Falls have access and opportunity to visit the Monasteries on the Island of Lake Tana. It should be noted that, one purpose of international tourists visiting Bahir Dar is to view the Water Falls. At present no facilities such as lodging, camping sites and formal view points are provided for tourists visiting the

falls. Visitors either walk or drive the few hundred meters from the settlement to the path that leads to the falls. The path dips down into steep rocky slope and then crosses the Blue Nile by way of the Fasil Bridge. On the foot path some villagers sell traditionally woven fabrics of good quality to passing tourists. This is the only economic activity related to the falls, and surprisingly enough considering the fame and quality of the site, nothing has been done to accommodate tourists visiting the area. Therefore, it is compulsory to envisage comprehensive site development and enhancement of activities for the benefit of the local population and for the protection of the site..

As indicated earlier,Tis Issat Falls ranks along side Axum, Lalibela and Gondar as an important site. for visitors on the northern tourist circuit. However, there are two crucial points that the Tis Issat Falls faces today. The first is the Government proposed Tis Abay II hydroelectric project .Of course, the project will provide significant benefits to the country as a whole and to local economy in the vicinity, Tis Abay and Bahir Dar town. However, the implementation of the project will have an adverse effect inducing a significant reduction in the level of water flow over the nationally important Tis Abay water falls. On the other hand, the tourism master plan proposed the development of a 9km^2 National Park around the Tis Issat falls. It was argued that, the interest of protection and preservation of Tis Abay Water Fall which is a natural tourist attraction will be endangered if timely and proper environmental accompanying measures are not taken on Tis Abay II Hydroelectric Project.

With this background, there are two competing projects around and within Tis Abay Water Falls. These are the need to establish Tis Abay National Park and Tis Abay hydroelectric project. This potential conflict of interest between energy production and tourism urges proper valuation of the resouce .To understand the conflicting interest of the two projects itis necessary to review the proposals of the above cited projects.

1.12.1 Creation of Tis Abay National Park

According to the Abay River basin Master Plan Project proposal, the rationale for immediate implementation of this National Park and Site development project is first to increasethe money generating attendance by tourists; and preserve the site. The project is located south of the falls area and includes the proposed park boundary encompassing the river to the North of Tis Issat, the falls and downstream gorge, and the highland to the north of the gorge, as well as the area on the southern side of the gorge. There is also the Site Development Project which is located at the heart of the National Park. The road to Bahir Dar borders the site area.

The project description emphasized that creation of Tis Abay National Park as planned by the local authorities will raise arguments that call for sound interventions in the decisions concerning Tis Abay II Power Station Project. As it was indicated in Abay River Basin Master Plan Project, the flow allocation for hydropower generation will of course affect the falls. Furthermore, it is noted that, under the proposed regime, mean flows in the wet season are drastically reduced in October from around 300 M^3/s to 60 M^3/s. In fact, it is

the occurrence of the regular high flows of more than 200 M^3/s which provide spectacular effects at the falls. Another worrying scenario is a seasonal pattern ranging from a minimum of 10 M^3/s to a maximum of 12 M^3/s. Such a regime significantly reduces the flows during both the natural wet season and the peak visitor months. According to Abay River Basin Master Plan Projects study, this would be a national disaster.

1.1.2.2 Tis Abay II Hydro Power Project

The objective of the project is to utilize the available head at the 46m high Tis Issat falls energy generation at a powerhouse located downstream of the water falls. A small power station, operating under the same principle of diverting flows from above the falls, has been in operation at the site since 1964. The project document explains that, the full development of the hydropower potential of the river in this locality necessitates regulation of the upstream flows, which has been achieved by the construction of the Chara Chara Weir on the fall of Lake Tana. The main works were completed in early 1996, but a modification to the gated outlets is required in order to increase the maximum regulated discharge to the river.

The environmental impact assessment of the project presented a detailed analysis of the critical issue of the flows allocation between the power station at and the Tis Issat Falls. Accordingly, the maintenance of a residual flow for the waterfalls is essential both to sustain the biodiversity of the aquatic ecosystem and to preserve the visual amenity value to the falls for tourism. At the same time, the economic value of the energy generator

depends on maximizing the flow through the power house. The trade-off between the use of the regulated River Abay for energy generation and the preservation of the waterfall to sustain their aquatic diversity and the value for both domestic and international tourism has been the major focus of this environmental assessment.

According to the project document, environmental impact assessment has been done to estimate the economic value of the potential contraction in the tourism industry brought about by the diversion of water from the Tis Abay Falls to the proposed Tis Abay II Hydropower Plant. The result indicated that benefits from production of electricity would appear to out weigh those from tourism.. It is suggested that a "best strategy" may involve exploiting the full potential of the falls for electricity generation in the short term, and reviewing the potential for developing tourism at some later date.

1.2. Problem Statement

As observed from the resource background of the Tis Issat water falls, despite its tremendous ecological and economic potential, is now under threat. The main danger has come from a proposed government intervention when Tis Abay II Hydropower Project is decided to be implemented before final agreement was reached between Ministry of Water Resource and Tourism Commisssion .It appears there is a conflict of interest between developing energy production and deriving economic benefit from tourism. Here it is important to note that preservation of Tis Issat Falls is an important symbol of cultural heritage in Ethiopia. Furthermore, preserving the aesthetic integrity of Tis Issat Falls is

perhaps one of the most crucial concern for environmental resource supporting recreational activities.

The Abay River Master Plan project profile of tourism indicates that there is an urgent need for the establishment of Tis Abay National Park. The establishment of the Tis Issat Water Fall National Park will pose an economic cost on the local population in terms of their loosing access to the park and the resources it contains. So estimation of the opportunity cost of establishing the park is one problem area that this study focuses on.

The Tis Issat Fall is nature based attraction area, its value lies primarily on its recreational value. It also contributes positively to the aesthetic value. Another problem area lies on the fact that the Tis Issat Water Fall like other environmental resources is difficult to quantify its economic value on the preservation of the recreation area.

Therefore, based on the above statement, the problems are:-

1. For Tis Issat Fall, like other environmental amenities, ordinary market does not exist, but it provides recreational benefits to its users. In this recreational site there are arbitrarily determined charges which do not reflect the full cost of providing the service or its true market value. Fixed admission fee could not be taken as a price to estimate a demand curve for the resource and to calculate the consumers' surplus enjoyed by users.
2. The preservation of the area or establishment of the park has an opportunity cost. These are benefits that are lost because of the existence of the reserve. The rural people who are living close to the areas may be affected by the proposal. Therefore, it will not be

surprising if the people argue against preservation of reserves since it might be related to the issue of poverty.

3. Tis Abay WaterFalls is a natural tourist attraction resource. If due consideration is not given, any development intervention activities in and around the area will affect ecological and environmental behaviour and will alter its beauty. The ongoing Tis Abay II Hydropower Project has raised controversy around development and preservation. The issue will be more problematic if the decision on development is not easily made reversible.

1.3. Objectives of the study

Based on the problems identified above the ultimate objective of this study is to estimate the economic value of Tis Issat Fall using the contingent valuation method (CVM) and travel cost method (TCM) . The specific objectives of the study include:-

1. To evaluate visitors and non-visitors preference through willingness to pay (WTP) for preserving recreation area and place a monetary value on the benefits received by resource users and potential users.
2. To measure the impact of developing the area into a national park on the local residents as well as the opportunity cost associated with the establishment of the park through willingness to accept (WTA) compensation.

The study intends to use demand based approaches and make comparative interpretation of the findings. The valuation will highlight some arguments for the preservation of this

nature based recreation area and provide clues on future policies for park development, biodiversity management and resource utilization .

1.4. Significance of the Study

The outcome of this study will be the estimation of the value of consumer's surplus and demand function of the resource. The result will provide the total value for the Tis Issat Fall from the view point of people who use it for recreational purposes (use value), for use at some future date (option values) and some "moral' altruistic (existence) value. These estimates are useful to make a rational decision, on whether to establish the park or not. And for the need of integrating comprehensive development policies. Especially the conflicting interest in relation to the preservation or development of Tis Abay Fall will be more apparent.

1.5 METHODOLOGY

1.5.1 Data Type and Sources

It is obvious that, the data type and source of the study depends on the techniques adopted or on the choice of valuation techniques. To measure the economic value of the Tis Abay Fall, which is the central problem of this study, two techniques, viz., contingent valuation method (CVM) and travel cost method (TCM) were employed. Both of them are survey based methods, which require careful sampling, training of enumerators and method of preparation and analysis. Therefore, the study uses a cross -sectional data set obtained from a survey which was conducted to obtain the data needed to estimate the amount people are willing to pay for the establishment of the park and the demand for the park visits. Survey on 300 respondents consisting of potential users ; users and losers was conducted to provide primary data to estimate the economic value of Tis Abay Water Falls . Therefore ,

Survey data were available to measure the economic value of the park using contingent valuation and travel cost methods.

Under contingent valuation approach, respondents were asked hypothetical questions, to elicit how much money they are willing to pay (WTP) or to receive (WTA) in exchange for the establishment of the park. Besides, information which might be helpful for the analysis of the determinants of WTP/WTA responses were also gathered. These include socio-economic and demographic characteristics, taste and attitudes of respondents.

Regarding the choice of payment vehicles and elicitation methods, there was an attempt to avoid controversial payment vehicles , anchoring and discrete bid level bias. Payment vehicle includes taxes, entrance fees and donation to a charitable trust. The major elicitation methods are open ended, take it or leave it (dichotomous choice), bidding game, and payment card. From payment vehicle taxes and entrance fees and from elicitation methods open ended and dichotomous were selected.

Users are respondents who were interviewed at the site.And potential users represented those who were interviewed at their residence in selected towns. Therefore, the users and the potential users' answers represent use - value and both direct and indirect benefits respectively. These monetary bids (WTP values) offered by potential visitors more closely indicate the social value of the fall as these bids reflect the maximum accepted amount that the respondents were willing to pay for the establishment of the park..

The contingent valuation survey questionnaire was developed based on the technique of Mitchell and Carson with some modifications to make it more relevant to the study. Generally the questionnaire designed has four main parts. These include respondents' personal data; description of the problem; attitude towards the resource and the willingness

to pay questions. The willingness to pay information was drawn out using both dichotomous choice and open-ended questions. In the case of open-ended question, the respondants were asked direct questions as to how much he / she is willing to pay ,while for dichotomous choice respondents were asked whether or not he/she is willing to pay for the preservation of the park.

In this research, evaluating the value of the Tis Abay Water falls based on CVM, the population of potential visitors was defined as total number of households who reside in the selected six towns. And population of visitors defined as number of 1998/99 total visitors .Based on this , total population of this study is total number of households living in six towns plus 1998/99 total visitors.

The survey has used Travel Cost Method (TCM) to collect data, for the formulation of trip generating function. The travel cost method infers the value users place on a recreational experience from their travel behavior. Therefore, the designed questionnaire contains information on cost of trip; nature of tourism related trips; time; quality and socio-economic and demographic characteristics of tourists.

There are two types of trip generating functions; one based on an individual model, the other zonal. Here the study has used zonal trip generating function. Visitors were zoned according to their state of origin and an average visitation rate for each zone was calculated. Next, zonal average visit cost is estimated. Further more, the availability of substitute sites, average income and taste were incorporated as variables.

1.5.2 Study Design

Contingent valuation and travel cost methods are commonly used to value open - access recreational and other environmental resources.. In order to implement the contingent valuation and travel cost valuation primary data has obtained from the survey.. The two approaches have three major procedural components; survey instruments design and development, survey administration and survey interpretation and analysis.

The design of the CVM study includes the way information is presented to individuals, the order in which it is presented, the question format and the amount and type of information presented. The task of valuation is to determine how much individuals benefit or lose as a result of the establishment of the proposed national park. To analyze CVM information, analysis of frequency distribution of WTP/WTA responses, cross tabulation of WTP/WTA and multivariate statistical techniques were applied.

The procedural steps involved in a TC study include, identifying a site to be valued and group residents in to zones around the site, estimating average travel cost and visitation rate to the site from each zone, deriving an aggregate demand curve for the site, and calculating benefits from the site

The data requirements of this approach are substantial. A survey must be carried out to establish the number of visitors to a site, their place of origin, socio- economic characteristics, the duration of the journey and time spent at the site, direct travel expenses, values placed on time by the respondent, the total population in each zone, purpose of the visit other than visiting the site, quality attributes for the site and substitute sites. Based on

the information collected, a trip generating formation, specification and estimation were carried out.

Sample Size and Design

CV and TC surveys have been found to produce reasonably consistent and replicable results compared to other approaches. Among the factors which influence the quality of the result are survey design and sample size. Both approaches are based on an intensive survey; this highlights the importance of having sound survey methodology, focus groups and pre-test. But, the survey techniques, sample size and sophistication of the analysis or intensity of the study is highly constrained by time, cost and purposes of the study.

Concerning survey methodology, the survey data may be collected through personal interview, by returned mailed questionnaires or by telephone interview procedures. In this study personal interview and mailed questionnaires procedures were used. Information from users was collected through face to face interview and responses from potential users obtained by mail. Three sets of questionnaires are prepared for three respective groups of information sources (respondents), i.e., and visitors, potential visitors and people who will lose access to the resource as a result of the establishment of the Park. Accordingly, primary information is collected from each of the groups.

The data for this study came from 300 interviewed respondents conducted at the site and six towns. The towns which were covered by the survey are Addis Ababa, Dire Dawa, Bahir Dar, Mekelle,Gondar and Awassa. For the travel cost approach and contingent valuation method 150 people were interviewed at the site. In addition, 10 people were also asked about their willingness to accept as a compensation for the establishment of a park. For contingent valuation approach, 150 people, spread over the selected seven towns, were

interviewed at their residence about their willingness to pay for the establishment of the park.

Questionnaire Design

Both contingent valuation and travel cost methods require proper questionnaire design, which can elicit the required data. The questionnaire design, development and components depend on the type of techniques considered here. Two questionnaires on contingent valuation and travel cost surveys were designed. CV survey method is used to estimate WTP for benefits derived from the preservation of the park or WTA for losses incurred by the establishment of the park. Regarding the contingent valuation survey questionnaire both WTP and WTA as measure of welfare change were used.

On the other hand, using data derived from questionnaire, the travel cost function is estimated about the amount of money and time people spend getting to a site to infer as value for the park. The travel cost survey instrument was developed based on information needed for valuing the non-market benefits of outdoor recreation resources. This survey questionnaire has three parts. The first consists of questions about socio- economic and demographic characteristics of the respondent and his or her household. The second part includes questions about the respondent's attitude towards environmental resources. The final part of the questionnaire contained questions about cost of trip, purpose of visits, quality and substitutes of the site.

Sampling Technique

One problem of the survey, particularly regarding CV studies is selection of representatives. In general, sampling must be random or probabilistic with in the relevant population in order to minimize self selection and other systematic biases. However, even when random sampling is applied, non-response bias must also be considered. Therefore, a follow up analysis of non-respondents is recommended in order to assess differences from respondents. To further minimize sampling bias, cluster or stratified sampling should be combined with probabilistic sampling (NOVAA, Supra notes, at 7576).

Here, we have applied random-sampling technique while interviewing 150 users. Both domestic and foreign visitors were interviewed at the site. Regarding sample selection of potential users three stages have been applied and different sampling techniques were used at each stage. The consecutive stages are identifying towns, determining sample size, locating industrial groups and particular respondent. Six towns are identified based on the share of population of the respective towns to urban population of the country, and the size of sample in each town is portioned according to their population. Next, industrial groups for each town were identified based on main economic categories. Lastly, after identifying industrial groups, the respondent's were randomly selected. Generally, sampling for potential users was done using stratified, quota and random techniques.

FIELD WORK PROCEDURE

Survey administration includes activities such as re-examination and revision of questionnaires, training interviewers and supervisors, pre-testing and carrying out the actual survey in the study area. An initial version of the questionnaire was developed with

intensive experimentation. Small group discussions were conducted with concerned bodies and relevant expertise in the region. The survey questionnaires were pre-tested with 20 respondents i.e. 10 users and 10 potential users. This procedure has helped to evaluate respondent's response rate and interviewers effect.

The survey, which covers visitors, was administered in collaboration with tourist tour organizations. And the interviewers were tourist guides who have close contact with tourists. Therefore, interview was conducted on 150 users by interviewers who were trained for this purpose. Some of the interviewers had previous experience .They had been employed to conduct the national population census.

Concerning the estimation of economic losers from local villagers on the establishment of the park, the survey were undertaken by trained interviewers who are working at Tis Abay information center. In order to implement the contingent valuation of potential users the survey was jointly carried with economic development and planning bereaus and other organizations in selected towns. First, brief orientation was given to each responsible institutions and persons to familiarize them with the study and accomplish their tasks earnestly. All questionnaires were completely answered and returned back.

After accomplishing the fieldwork of the survey extracting of information were done. Each questionnaire was edited, coded and verified. The verified data was entered in the computer for needed statistical computation. Then the data entered was checked and cleaned to identify questionnaires, which are qualified for analysis. Accordingly, out of the 300 respondents, 292 usable interviewers were completed and 8 incomplete interviews were discarded because of inconsistencies and incompleteness in the respondents' answers.

1.5.3 Data Analysis

After the survey administration was completed the next step was to undertake the interpretation of information from the survey . Information gathered from the survey could be typically analyzed using different techniques. Here, both descriptive and statistical analysis were used. The choice of the analysis techniques depends on the type of data needed to be estimated.

Regarding contingent valuation method, descriptive analysis is used to summarize the over all findings of the CV survey . This might help to calculate average WTP. In doing so, the frequency distributions of responses to WTP questions were examined. This information was then applied to predict the distribution of WTP responses to the total population and the WTP for the environmental good or services at a specific price level.

Concerning the Travel cost method, descriptive analysis is used to estimate travel cost and visitation rates for each zone, to derive an aggregated demand curve for the site and calculate benefit from the site.

In addition to descriptive analysis statistical methods were used to examine how respondent's answers were influenced by different variables. In the case of contingent valuation method, three different types of multivariate models were used to analyze the relationship that describes the determinants of the WTP bids. First, ordinary least squares (OLS) was used to explain the WTP bids obtained in response to the open -ended question. The second model is tobit, where the dependent variable is zero for significant fraction of the observations. The third method is probit model, which is used to analyze the responses of the respondent's to yes/ no questions. All three multivariate-modeling approaches were used for the same types of variables in explaining variation in WTP/WTA bids. The

models were used to explain dependent variable as a function of socio-economic and demographic characteristics and attitudes, and taste of respondent's. Regarding Travel Cost Method, the trip generating function is statistically determined through multiple linear regression.

1.6 Coverage and Limitations

In measuring the economic value of Tis Abay Falls the coverage of this study is limited to the applications of Contingent Valuation and Travel cost methods. Some general points such as technical acceptability, users friendly and costs were considered before reaching decision to use these two valuation techniques It was argued that the need to place proper values on environmental goods and services is crucial for sustainable development. Information on the economic value of Tis Abay waterfalls is therefore important for policy makers to make decisions. The advantage of using two valuation methods is to compare the results.

This study estimates the economic value of water falls and the benefit of establishing the national park. Since it focuses only on the benefit sides it should not been seen as benefit-cost analysis. The cost only includes economic cost on the local population in terms of their loosing access to the park and the resource it contains.

Evaluating benefits and costs of establishing a national park involves combined ecological and economic analysis. But this study limits itself on evaluating economic benefits and opportunity costs associated with the establishment of the park.

The costs of the establishment and protection of the park include direct costs, indirect costs and opportunity costs. Here, it focuses only on the estimation of the benefits that are lost as a results of the establishment and operation of the park to local residents..

Other limitation of the study is associated with the selection of different valuation techniques. Both contingent valuation method and travel cost technique have their own limitations and problems. So the interpretation of the result should be seen in this context.

This survey was limited to 300 respondents and this might expose to a small sample bias and reliability problem.

Some of the respondent's were participants of "Gondar Millenium" and the main purpose of the visitors was conference and this might affect the treatment of different types of travelers.

The questionnaires were prepared only in Amharic and English language, and there were some visitors who could not communicated with these two languages and this has created problem of specifying correct zonal travel cost function.

2. LITERATURE REVIEW

2.1 LITERATURE REVIEW: THEORETICAL PERSPECTIVE

2.1.1 The basic economic theory of welfare measurment

The standard theory for measuring welfare changes was developed for the purpose of interpreting changes in the prices and quantities of goods purchased in markets. This theory has been extended in the past 50 years to non-market or public goods such as environmental quality. This theory assumes that people have well-defined preferences over alternative bundles of consumption goods, including the quantities of non-market goods, and that people know their preferences. Also it assumes that these preferences have the property of substitutability.

The measurement of a project's benefits has been extensively discussed in the economic literature and it is concerned with the concepts of producer surplus and consumer surplus. The concept of consumer surplus was discovered in1844 by Dupuit, who in a path-breaking article, tried to measure public utility such as roads, bridges and canals. He showed that the utility an individual obtains from the consumption of a certain quantity of a good is greater than the price he pays because the price represents only the utility of the marginal unit and not that of each intra-marginal unit (Helmens ,1979).

Dupuit (1884) described consumers' surplus as being the difference between the price actually paid when purchasing a commodity and the price the consumer would have been willing to pay. This willingness to pay diminishes as more units of the commodity are consumed. The reason for the diminishing willingness is that the extra satisfaction derived from a good declines the more the individual consumes of it(Hanley and Spash, 1993).

The next writer who used the concept was Marshall"(1920) who, in his principles also points out that the satisfaction a person gets from the purchase of certain quantity of a good exceeds that which he would be willing to pay rather than go without the thing, over that which he actually does pay is the economic measure of this surplus of satisfaction. It may be called consumers' surplus. Marshall was concerned with finding the condition under which a money measure of consumer welfare would equal the "true" utility surplus(Hanley and Spash, 1993). He has developed the association of consumer's surplus with the curvilinear triangle under the ordinary demand curve. The area under a Marshallian ordinary demand curve but above the horizontal price line measures ordinary consumer's surplus.

The concept of consumers' surplus can easily be extended to general equilibrium to measure welfare gains or losses from environmental quality change. It based on Neo-Classical consumer theory which attempts to model for goods given certain assumption, i.e, the consumer possesses a continuos and increasing utility function. Marshallian consumer surplus can be derived in mathematical form as follow:

$U = U(X)$

where $X = (x_1, --, x_n)$ is a vector or bundle of goods consumed

The problem of utility maximization can be written as

Max U(X)

s.t $M - P x_1 = 0$ ----------(1)

x is in X

$P = (P_1, --, P_n)$, $(P \geq 0)$ price in monetary units

$M > 0$ = income

The consumer wants to find the points on the budget plane that achieves maximum satisfaction. The first order condition for an interior solution are:

$$\frac{\partial U(X)}{\partial X_i} - \lambda p_i = 0$$

$$M - PX = 0 \qquad \text{----------(2)}$$

Where λ= Lagrange multiplier

The ordinary or Marshallian demand curve provides the solution to this problem. The Marshallian demand curve is given as

$$x_i = x_i(P,M) \qquad \text{----------(3)}$$

That is, the quantity of x_i is the function of a vector of prices P and money income M.

Substituting the demand function in to direct utility function gives indirect utility function that is :

$$V[X(PM)] = V(P,M) \qquad \text{----------(4)}$$

Differentiating with respect to the ith price and invoking the envelope theorem yields: -

$$\frac{\partial V}{\partial p_i} = -\lambda\, x_i(P,M) < 0 \text{ for all } i$$

$$\frac{\partial V}{\partial M} = \lambda(P,M)$$

where λ has been written as a function of prices and income to highlight the fact that λ is not a constant

Applying Roy's identity, $-\dfrac{\partial V}{\partial p_i} \Big/ \dfrac{\partial V}{\partial M} = x_i(P,M)$

This suggests that a theory of demand may be constructed by making assumptions on the indirect utility function instead of direct utility function.

To examine the impact infinitestinal change in P and M on utility, totally differentiating indirect utility gives:-

$$dv = \sum_{i=1} \frac{\partial pv}{\partial p} dp + \frac{\partial v}{\partial M} dM$$

$$= -\lambda \Sigma x_i \, d p_i + (dm)$$

$$= -\lambda (Xdp - dm)$$

The change in utility associated with the a change in prices and income from $p^0\ M^0$ to $p^1\ M^1$ is

$$\Delta u = v(p^1\ M^1) - v(p^0\ M^0)$$

$$= \int c \ (\Sigma V_i \, dp_i - V_i \, dm)$$

Where c is path of prices and income between initial and final price income vector, and gives the sum of areas under ordinary uncompensated or Marshallian Demand Curve for change in prices from p^0 to p^1

Consumer surplus defined as follows

$$S = \int_c (X(PM)\,dp - dm \text{ (assuming that } \lambda = 1). \quad \text{---------(5)}$$

The money measures consumer surplus of utility change is obtained by adding to the change in income all the changes in consumer surplus in the markets where prices change consumer surplus can measure welfare change but ,there are theoretical problems using the consumer surplus as a measurement of utility. The consumer surplus suffers from the problem of path independence. If the path independency conditions do not hold, there is possibly an infinite number of money measures of consumer surplus for a unique change in utility. This problem necessitates to resort to other options i.e. compensating and equivalent variations. Even if path dependence was not a problem, changes in money measures of consumers' surplus may fail to correspond to changes in utility. This is because the marginal utility of money may vary with respect to income if it changes (Hanley and . Spash 1993).

The applied problem combined with the underlying utilitarian background of cardinal analysis, the consumer's surplus measure as proposed by Marshall becomes unacceptable. A theoretical refinement of the ordinary consumer's surplus was done by Hicks (1941). Compensating variation, compensating surplus, equivalent variation and equivalent surplus are four measures of consumer welfare change resulting from a price change, which was refined by Hicks. These four measures of welfare changes are defined by Freeman as follows:

Compensating variation (CV) measure asks what compensating payment (that is, an offsetting change in income) is necessary to make an individual indifferent between the original situation and thc new price set.

Equivalent Variation (EV) – measure asks what change in income (given the original Prices) would lead to the same utility changes as the change in the price of one good.

Compensating Surplus (CS) – measures what compensating payment will make the individual indifferent as to the original situation and the opportunity to purchase the new quantity of the good whose price has changed.

Equivalent Surplus (ES) – measure asks what change to income is required, given the old prices and consumption level in order to make the individual as well as that person would be with the new price set and consumption.

The above four measures of welfare changes can be derived mathematically as follow:

To define compensating variation (cv), we start from expenditure function. Given an attainable utility level, U say, the expenditure function is the minimum amount of expenditure necessary to attain a utility level at least as high as U at given price p,

$$e(p,u)= \min p_i x / u(x) \geq u \qquad \text{-------(6)}$$

$$= px\,(p,u)$$

$$\frac{\partial e}{\partial p} = x(p,u)$$

We solve, to get the Hicksian or compensated demand function.Using this concept we can define cv in income associated with a change in prices and income from (p^0 , M^0) to (p^1 , M^1)

$$CV = M^1 - M^0 + e(p^0 , M^0) - e(p^1 , M^1) \qquad \text{---------(7)}$$

We can relate to Hicksian demand function

$$CV = e(p^0 , v^0) - e(p^1 , u^0) \qquad \text{---------(8)}$$

$$= \Delta M - \int c\ X\ (P, u^0)\ dp$$

$$= -\int c\ X\ (P\ u^0)\ dp$$

This gives the minimal expenditure necessary to reach the utility level V_0 when $P = p^0$ less the minimal expenditure required to reach V0 when the prices are changed to $P = p^1$.

Similarly we can define equivalent variation (EV) as follows:-

$EV = M^1 - M^0 + (P^0, u^1) - e(P^1, u^1))$ ---------(9)

$EV = \Delta M - \int c\, X\ (P, u^1)\, dp$ ---------(10)

So far we have dealt with the change of welfare as a result of change in price and now consider change in welfare due to change of public good in quality which is linked to rationing quantity constraint. Therefore, no individual can choose to adjust the level of public good and considered additional constraint consumer utility function is defined as:-

$U(X, Z)$ ---------(11)

s.t $PX + R - Z = Y$

$Z = Z$

Where X = Private good

Z = Public good

R = price of public good

Solving this maximization problem, we get demand function X (P, Y- Rz , Z).This will give us two measure of welfare change i.e Compensating Surplus (CS) and Equivalent Surplus (ES) .Thus

$CS = e(P, R, Z^0, U^0) - (P, R, Z^1, U^0)$ ---------(12)

$CS = e(P, Z^0, U^0) - (P, Z^1, U^0)$ ---------(13)

ES also defined as:

$ES = e(P, R, Z^0, U^1) - (P, R, Z^1, U^1)$ ---------(14)

$ES = e(P, Z^0, U^1) - (P, Z^1, U^1)$ ---------(15)

Here we should note that the compensating surplus and equivalent surplus measure require that the quantity consumed be held constant and equivalent and compensating variation measures allow the consumer freedom to choose the quantities purchased after a change in

the economic situation. There is a problem , which of the two measurements to use. According to Mitchel and Carson(1989), many environmental goods are public goods and are therefore appropriately measured by these two surplus measures. There is a belief that in the public good case surplus and variation measures are identical under the equivalent and compensating case respectively (Freeman 1979). While the two variation measures are theoretically well established, there is a problem as to which should be used in a particular situation.

According to Hanley and Spash (1993), the choice between the two measures will depend upon the characteristics of the welfare change being analyzed. However, while both measures are consistent with theoretical definition of welfare neither is readily observable from market data. Selection of welfare measure involves the questions of appropriateness and practicality. The Marshallian Surplus measure was frequently chosen on the grounds of practicality, even though it was recognized that the measure was inappropriate in that it did not answer any specific well- formed welfare question Willing's development of the bounds for the errors of approximation in using consumer surplus(S) gave encouragement to this practice. But quickly on its heels have come new approaches to exact welfare measurement that offer the opportunity to calculate the more appropriate CV and CV measures directly. (Freeman III, 1993). Hanley and Spash (1993) have summarized by saying that, the use of consumer surplus as a measure of welfare charges can be justified, as an approximation to the correct measure refined by Hicks, through the use of Willing conditions.

WTP/ WTA

Now it is possible to proceed to other related concepts i.e. willingness to pay (WTP) and willingness to accept (WTA). Environmental resource economic value is measurable in relation to utility functions though the concepts of willingness to pay and willingness to accept compensation. WTP is the maximum sum of money the individual would be willing to pay rather than do without an increase in some good such as an environmental amenity. WTA is the minimum sum of money the individual would require to voluntarily forgo an improvement that otherwise would be experienced (Freeman III, 1993).

The task of valuation is to determine how much better or worse off individuals are (or would be) as a result of change in environmental quality or provision. Economists define the value of a change in terms of how much of something else(usually expressed as an amount of money) an individual is Willing-to-Pay to get this change (or how much they would be Willing-to-Accept in order to permit the change to occur)(Pearce,1992). Here,the question arises as to which measure of value -- Willingness-to-Pay or Willingness-to-Accept -- should be used for benefit estimation. Until recently, it was assumed that in most practical situations the difference between these measures would be small so long as there was an absence of strong income effects. Willig [1976] developed a precise analytical expression of the size of this potential difference, and showed that in a wide variety of market situations, this divergence between WTP and WTA measures would be very small.

However, a substantial body of empirical evidence has recently been developed that provides convincing evidence that WTP and WTA measures are often quite different Brookshire, [1980] and Knetsch and Sinden, [1984]). Typically WTP measures turn out to

be substantially less than WTA measures for the same policy change. The reaction of many economists to this evidence was to argue that the WTA results were unreliable and should not be treated seriously (Dwyer and Bowes, [1979]; Kahneman, [1986]). The implication was that monetary estimates of well-being based on WTA measures should not be used in policy analysis.

However, the difference between WTP and WTA measures has proven to be extremely robust in a wide variety of experiments, and appears to reflect a real difference in individuals' valuation of a policy change depending on how the policy is 'framed' or the individual's 'reference point'.

Recently, Hanemann [1992] has offered another explanation for the divergence between WTP and WTA measures of economic value. He has shown that such differences are consistent with economic demand theory when there are few or poor substitutes for the goods or services in question and when these goods or services are highly valued by individuals. These conditions are likely to be true for many environmental goods.In summary, good economic analysis will require good judgment on the question of whether to use WTP or WTA measures of economic value.

2.1.2 Classification of environmental resource values

There are various approaches to classify values and there is no agreed set of definition, terms, and classification concerning environmental resource values. According to Freeman III (1993), most of the classification systems recognize types of resource or environmental

media, types of effects and economic channels. The first approach implies that the legal and administrative separation of responsibilities for controlling environmental quality to different agencies . Another way of classifying environmental and resource flow is according to whether they impinge directly or indirectly upon humans through their impact on other living organisms, or indirectly through inanimate systems. The Environmental and resource service flows can also be classified according to whether they convey their effects through the market system in the form of changes in incomes to producers and change in the availability of and prices for marketed goods and services to consumers, or through changes in the availability of goods and services not normally purchased through markets.

The monetary measure of a change in an individual's well being due to a change in environmental quality is called the Total Economic Value. It is not environmental quality per se that is being measured then, but people's preferences for changes in that quality. Valuation as such is anthropocentric in that it is of preference held by people, and, the value of something is established by an exchange transaction (Pearce,1992). Total Economic Value of a resource can be disaggregated into its constituent parts consisting of use value and non-use value. Use value can be direct, indirect and option value. Non-use value on the other hand is proved to be both difficult to define and measure. Non-use values can be subdivided into existence value and bequest value. Sometimes bequest value is also defined as use-value.

Direct use value is fairly straightforward in concept but is not necessarily easy to measure in economic terms. Direct use values where an individual makes actual use of a facility, for example visiting a recreation area to go fishing, and is willing to pay for this use. Indirect use value such as where benefits are derived from ecosystem function and correspond to

the ecological concept. Another component of use-value is option value, which relate to the amount individuals would be willing to pay to conserve the resource for future use. That is, no use is made of it now but use may be made of it in the future. Option value is thus like an insurance premium to ensure the supply of something the availability of which would other wise be uncertain. While there can be no presumption that option value is positive it is likely to be so in the current context (Bishop (1982).

The idea of option value may have been most useful in stimulating the more rigorous analysis of the theory of welfare measurement under uncertainty. (Freeman III ,1993) Option value also related to value of information and it was believed that option value is greater than the value of information. It can be summarized as, option value is not identical to the value of information. The option value is, instead, a conditional value of information – conditional on retaining the option to preserve or develop- and more over, is equal to or greater than the (on conditional) value of information. (Fisher and Hanemann, 1986). Option value is based on the idea that users will be willing to pay for the option of using the environment in the future even if they do not use it currently.

In a broader context, the history of option value will stand as an increasing case study in the evolution of economic concepts. At the outset, option value has strong intuitive appeal, but was less clearly defined than it appears at first glance. (Bishop 1982). The concept of option value does reflect individual's valuation and does relate to resource changes. But it is not separate component of value rather it is an algebraic difference between two measures based on different perspectives in valuation (Kopp and Smith editors 1993).

Another interesting issue related to option value is the concept of quasi – option value. It is at best misleading to consider option value and quasi-option value as separate categories

of value. Quasi option value is the value of information that arises between the choice of conservation or development now and development in the future. It is the value of learning about the future benefits that would be precluded by development now. It will be positive if the information depends on the passage of time, as one would expect it to be the concerned environmental resource. Quasi – option value can not be added to option value as they measure different concepts.

One main component of non-use value is existence value and relates to valuation of the environmental asset unrelated either to current or optional use. Existence values arise from preventing the extinction of a species or preventing the complete destruction of a resource. Other part of non – use value is bequest value which measures an individual's willingness-to- pay to ensure that their heirs will be able to use a resource in the future.

2.1.3 Methods for measuring environmental resource values

There are basically two broad approaches to valuation, each comprising a number of techniques. The approaches are the Direct and Indirect approaches.

2.1.3.1 The Direct Valuation Approach

The Direct approach looks at techniques which attempt to elicit preferences directly by the use of survey and experimental techniques, such as the Contingent Valuation and Contingent Ranking methods. People are asked directly to state or reveal their strength of preference for a proposed change.

A. Contingent Valuation Method (CVM)

Contingent valuation was originally proposed by Davis (1963) and the technique is now widely accepted by resource economists, following a great deal of empirical and theoretical refinements which took place in the 1970's and 1980's. The CV method uses survey questions to elicit people's preferences for public goods by finding out what they would be willing to pay for specified improvements in them. In circumvents the absence of markets for public goods by presenting consumers with hypothetical markets in which they have the opportunity to buy the good in question. The hypothetical market may be modeled after a private goods market or a political market(Mitchell and Carson ,1989).

A contingent market encompasses the good itself, the institutional context in which it would be provided, and the way it would be financed. The situation the respondent is asked to value is hypothetical and respondents are assumed to behave in an identical way to that in a real market. Structured questions and various forms of 'bidding game' can be devised involving 'yes/no' answers to questions regarding maximum willingness-to-pay. Econometric techniques are then used on the survey results to find the mean bid values of willingness-to-pay. This is known as the Contingent Valuation Method (CVM), and measures precisely what the analyst wants to know -- the individual's strength of preferences for the proposed change -- and can be used not only for non-marketed goods and services, but market goods as well.

Interest in CVM has increased over the last decade or so because, firstly, it is the only means available for valuing Non-use values -- the values obtained from Indirect techniques are not aimed at capturing Non-use values. Secondly, estimates obtained from well designed properly executed surveys appear to be as good as estimates obtained from other

methods. Thirdly, the design, analysis and interpretation of surveys has improved greatly as scientific sampling theory, benefit estimation theory, computerised data management and public opinion polling has improved.

There are three basic parts to most CV survey instruments: (Baterman ,1993;Carsen,1989)

First, a hypothetical description (scenario) of the terms under which the good or service is to be offered is presented to the respondent. This will include information on when the service will be available, how the respondent will be expected to pay for it, how much others will be expected to pay, what institutions will be responsible for delivery of the service, the quality and reliability of the service.

Second, the respondent is asked questions to determine how much he would value a good or service if confronted with the opportunity to obtain it under the specified terms and conditions. These questions take the form of asking how much an individual is WTP or WTA for some change in provision. Econometric models are then used to infer their WTP for the change.

Third, questions on socio-economic and demographic characteristics of the respondent are asked in order to relate the answers respondents give to the valuation questions to the other characteristics of the respondent.

A respondent can indicate his/her choice or preference in a number of ways. One way is to answer a question as to whether or not he would want to purchase the service if it cost a specified amount. These are known as discrete or dichotomous choice questions. Another possibility is to ask the respondent a direct question about the most they would be willing to pay for the good or service -- known as continuous or open-ended questions. These two types can be combined in a CV questionnaire to create different ways of eliciting the

valuation information, e.g. a bidding game. In addition, respondents may be shown a list of possible answers in the form of a 'payment' card, and asked to indicate their choice, though this requires a careful determination of the range of possible answers. The appropriate choice for a specific problem is a matter of judgement on the part of the analyst.

An assessment of the technical acceptability of CVM involves looking at various methodological issues, which we divide into issues of Reliability, Bias and Validity.

Reliability

This looks at the degree to which the variance of WTP responses are attributable to random error. The greater is the degree of non-randomness, the less the reliability of the study such that mean WTP answers are of little value (Mitchell et al,1989). The variance arises as a consequence of true random error (essential to the statistical process); sampling procedure (variance is minimized by ensuring a statistically significant sample size); the questionnaire/interview itself (it is important for reliability to ensure that the CVM scenario is as realistic and familiar to the respondent as possible). In order to assess reliability, a number of practitioners have advocated the use of replicability tests, i.e. repeating an experiment using different samples to see if there is correlation between the variables collected.

Bias Issues

Bias exists in CVM responses if they systematically under state or over state true value (Hanley and Spash 1995). This includes issues like strategic bias, hypothetical bias, information bias, aggregation bias, interviewer and respondent bias, payment vehicle bias and starting points; Anchoring and Discrete bid level bias

Strategic Bias-- the problem of strategic bias has long worried economists. The behaviour necessary for this kind of bias depends on the respondent's perceived payment obligation and his expectation about the provision of a good. Where individuals actually have to pay their reported WTP values then there is the temptation to understate their true preferences in the hope of a free-ride. Or if the price to be charged for the good is not tied to an individual's WTP response, but the provision of the good is, then over reporting of WTP may occur in order to ensure provision. Empirical investigations of strategic bias are well documented. One approach of testing for strategic bias argued that if true WTP bids are theoretically normally distributed then strategic behaviour would bias this distribution towards zero (Brookshire et al [1976]).

Hypothetical Bias-- The hypothetical nature of the market in CV studies can render respondents answers meaningless if their declared intentions cannot be taken as accurate guides of their actual behaviour. Some writers have looked at hypothetical bias in terms of increased bid variance and low model reliability whereas others view the use of hypothetical markets as having other distinct problems. Research into hypothetical markets and their predictive ability has looked at the attitude-behaviour relationship, and experiments examining substitution of real for hypothetical markets.

A survey of experimental tests reveals that by using a WTP format instead of a WTA format hypothetical bias, which may be a significant problem in WTA studies, can be reduced to an insignificant level. The tests usually compare the hypothetical bids with bids obtained in simulated markets where real money transactions take place. Results from such studies suggest that the divergence between actual and hypothetical WTP is much less than

that for WTA, the reason being that respondents are more familiar with payment rather than compensation scenarios (Hanley [1990]).

The Embedding Problem--There is evidence to suggest that people have problems understanding certain kinds of questions that depend on insights into their own feelings or their memory of events or feelings. This kind of problem will be very apparent in environmental issues because these evoke deeply held moral, philosophical, and religious beliefs. One particular problem in this vein much looked at, is that respondents may interpret the hypothetical offers of a specific good or service to be indicative of an offer for a broader set of similar goods and services. This is known as the embedding problem since the value of the good being sought is embedded in the value of the more encompassing set of goods or services reported by the respondent. This problem is indicative of an even broader problem with obtaining accurate answers. Kahneman and Knetsch [1992] provide recent empirical support of embedding in a study looking at WTP for maintaining the quality of fishing lakes. Individuals were instead thought to purchase moral satisfaction in their WTP responses (UNEP,1998).

Information Bias is the quality of information given in a hypothetical market scenario certainly affects the responses received. Empirical evidence suggests only a weak information bias with some studies finding a threshold effect for information build up, below which no bias is detectable but above which a positive and weak effect is found. Other studies have found no significant information bias though bid variance was found to fall as information increased. A number of writers have argued that information will always affect WTP but that this result applies to all goods be they public or private (Halay and Spash, 1995).

Aggregation Bias- There may be problems in aggregating individual valuation responses. Analysts will often wish to summarise respondents' answers to valuation questions in terms of the mean willingness-to-pay for the good or service, or, develop an aggregate benefit estimate for a community or region. Two types of problems here are sampling errors and insufficient sample size. Sampling errors include a non-random sample being selected and used. This may result from non-responses to the questions. Non-responses are more likely to occur for certain types of individuals who are not randomly distributed in the population. If the size of the sample is small, there is a risk that the characteristics of the sample will not be representative of the general population thus resulting in findings which suffer wide confidence intervals. Furthermore, non-normal WTP distributions can cause the sample mean to be biased by the major tail of the distribution, necessitating the use of truncated means as an aggregate measure of welfare.

Often, on-site surveys will ignore the non-use values held by non-visitors such that additional random sample off-site surveys will be needed to estimate non-use values. Empirical studies have found total non-use value is significant and can even exceed total use value (UNEP,1998).

Interviewer and Respondent Bias -The way interviewers conduct themselves and the interview can influence responses. This can be minimized by using mail surveys though this can mean less information is forthcoming and give rise to hypothetical bias. Mail surveys further give low response rates. Another variant of this problem is compliance bias, whereby the respondent tries to guess the 'correct' answer or not give the questions proper considerations. To minimise this problem use of professional interviewers should

be undertaken, and they should follow the wording of the questionnaire exactly, with the respondents being offered a choice of prepared responses (UNEP,1998)..

Payment Vehicle Bias - A number of studies have found that WTP varies depending on whether an income tax increase or an entrance fee is used as a payment vehicle (method of payment for the good). To minimise this bias, controversial payment vehicles should be avoided and a method used which is most likely to be used in real life to elicit payment for the good in question (Halay and Spash, 1995).

Starting Points and Discrete Bid level Bias -- The suggestion of an initial starting point in a bidding game can significantly influence the final bid, e.g. choosing a low (high) starting point leads to a low (high) mean WTP. The use of starting points can reduce the amount of non-responses and the variance in open-ended type questionnaires, though it may also result in respondents not giving their answer serious thought and taking a cognitive short cut in arriving at their decision. Optimal bids should be set so that the lowest bid results in all respondents accepting it, and the highest bid results in all respondents rejecting it. Within this range, bid levels should reflect the distribution of bids so that, optimally, each bid interval reflects the same proportion of the population (Freeman III, 1993).

A recent study by Bateman et al [1992], used a large sample open-ended format WTP question in order to estimate the distribution and range of WTP bids. A bid function was then estimated so that a probability of discrete bid acceptance curve could be mapped out. Eight WTP bid levels were subsequently chosen for a dichotomous choice experiment. It was thought that several factors may have influenced this result including open- ended format studies are subject to free rider problems whereas dichotomous choice are not; dichotomous choice formats may be subject to interviewer bias and are more likely to

exhibit anchoring bias thereby biasing upwards the mean WTP. To conclude, open-ended approaches are likely to provide a lower bound WTP estimate below which true WTP is unlikely to lie, while dichotomous choice approaches provide an upper bound WTP estimate above which true WTP is unlikely to lie.

Validity

The validity of any piece of hypothetical data is the degree to which it measures the theoretical construct of interest (Mitchell and Carsen 1989). There are three categories of validity testing used in CVM studies. These are Content, Criterion and Construct validity.

Content Validity-- This looks at whether the WTP measure estimated in a CV study accurately corresponds to the object being looked at (the composition). Such testing cannot be formalised resulting in analysts having to decide in a subjective manner whether a CVM has asked the correct questions appropriately, and if the WTP measure is in fact what respondents would actually pay for a public good if a market existed.

Criterion Validity-- here the CVM estimates are compared with the 'true' value (the criterion) of the good in question. This is not feasible for many environmental goods (and is why CVM is carried out in the first place). However, experiments comparing hypothetical WTP sums from CVM with 'true' WTP as determined by simulated markets using real money payments have been carried out as mentioned in the earlier section on hypothetical bias. These find that in general WTP format CVM studies give valid estimates of true WTP, though this is not the case for WTA.

Construct Validity(including Convergent and Theoretical validity) -- theoretical validity tests whether the CVM measure conforms to theoretical expectations and convergent

validity tests whether the CVM measure is closely correlated with measures of the good found using other valuation techniques.

Theoretical validity tests have centered on examining bid curve functions to see if they conform to theoretical expectations e.g. if elasticities are correctly signed and feasibly sized; tests on the significance of explanatory variables (by looking at simple 't' statistic tests, and the explanatory power of bid functions).

Convergent validity tastes CVM measures with revealed preference techniques such as Travel Cost and Hedonic Pricing. However, the methods compared are usually measuring different theoretical constructs e.g., CVM measures use and non-use values whereas Travel Cost only measures use values. Furthermore, CVM provides ex-ante measures of WTP whilst hedonic pricing and travel cost estimates are from ex-post contexts. As such the usefulness of convergent validity testing is not as great as at first thought.

B. Contingent Ranking Method (CRM)

This is similar to contingent valuation except that the questionnaire is content to obtain a ranking of preferences which can later be 'anchored' by the analyst in a real price of something observed in the market. Respondents are given a set of hypothetical alternatives, each depicting a different situation with respect to some environmental amenity and other characteristics that are presumed to be arguments in the respondent's preference function. Respondents are asked to rank the alternatives in order of preference. (Freeman III 1993).

2.1.3.2 The Indirect Valuation Approach

Indirect approaches are those techniques which seek to elicit preferences from actual, observed market based information. Preferences for the environmental good are revealed indirectly, when an individual purchases a marketed good with which the environmental good is related to in some way. The techniques included here are, Hedonic Price and Wage techniques, the Travel Cost method, Avertive Behaviour, Dose-Response and Replacement Cost techniques. The Indirect group of techniques can be divided into two categories. These are: surrogate market approaches and conventional market approaches.

Surrogate market approaches

Surrogate market techniques involve looking at markets for private goods and services which are related to the environmental commodities of concern. The goods or services bought and sold in these surrogate markets will often have as complements (or attributes) and substitutes the environmental commodities in question.

A. Avertive Behaviour Technique

Perfect substitutability is the basis of the Averting Behaviour technique, which looks at how averting inputs substitute for changes in the environmental good of concern. Averting behavior and dose-response methods share the characteristics that changes in expenditure are due to the need to substitute other inputs for changes in environmental quality (Hanley and Spash 1995).

In order to apply this approach the averting behaviour must be between two perfect substitutes otherwise an underestimation of the benefits of the environmental good will

occur. Averting behaviours are never likely to involve perfect substitutes and even when they do, bias in the estimation of benefits can still occur. For example, if there is an increase in environmental quality, the benefit of this change is given by the reduction in spending on the substitute market good required to keep the individual on their original level of welfare. Although the technique has rarely been used, it is a potentially important source of valuation estimates since it gives theoretically correct estimates which are gained from actual expenditures and thus have high criterion validity.

B. Travel Cost Method (TCM)

The idea for the TCM is attributed to Harold Hotelling, who proposed the basic notion of the method to a park service director in a 1947 letter. It was not put into practice extensively until late 1960's, and has only reached a more refined state in relatively recent years. Jack Clawson and Marion Knetsch are widely regarded as two of the most important figures in the early development of the TCM. Philosophically, the TCM falls in to the general category of Neo-classical welfare economics, which assumes that individuals maximize their utility subject to certain constraints. The TCM is a means of determining value figures for things which are generally not bought and sold, and therefore fall outside of the market's pricing system. The non-market assets which is most often applied to are recreational resources which necessitate significant expenditure for their enjoyment (Hanley and Spash ,1995) .

Weak complementarity is the basis on which the Travel Cost approach works. The approach has been widely used to measure the demand and benefits of recreation site facilities and characteristics. Travel is used to infer the demand for recreation by virtue of

the fact that it is a weak complement to recreation, i.e. when the quality of the recreation site changes, we look at how expenditures on the marketable complement, travel, change.

The Travel Cost method estimates the demand function for recreational facilities and finds how visitation to a site changes -- how the demand curve will shift -- if an environmental resource in the area changes.Information on money and time spent by people in getting to a site is used to estimate willingness-to-pay for a site's facilities or characteristics. The problem here is that recreation sites charge a zero or negligible price which means that it is not possible to estimate demand in the usual way. However, by looking at how different people respond to differences in money travel cost (including transport, admission and the value of time, etc.) we can infer how they respond to changes in entry price, since one acts as a surrogate price for the other and variation in these prices results in variation in consumption.

The Travel Cost demand function is interpreted as the derived demand for a site's services and depends on the ability of a site to provide the recreation activity. Only Use Values are therefore considered, with Existence and Option values being ignored. Since the recreation activity takes place at specific sites that have observable characteristics and measurable travel costs then recreational service flows are described as site specific. The approach can therefore provide us with estimates of the value of the site itself and, by observing how visitation rates to a site change as the environmental quality of the site changes, provide us with values for environmental quality itself (Fletcher,1990).

The travel cost approach makes the central assumption that visit costs can be taken as an indication of recreational value. However, if individuals have changed their place of residency so as to be close to a site then the price of a trip becomes endogenous and the

central assumption is violated. The estimated demand curve will lie below the true demand curve and so consumer surplus will be underestimated. A similar challenge to the central assumption also arises in cases where the on-site time is not the only objective of the trip, e.g. where multi-purpose trips are made.

A survey must be carried out to establish the number of visitors to a site, their place of origin, socioeconomic characteristics, the duration of the journey and time spent at the site, direct travel expenses, values placed on time by the respondent , purpose of the visit other than visiting the site (multi-purpose visits raise problems for the technique, and a whole range of environmental quality attributes for the site and substitute (Hanley and Spash,1995;Freeman,1993). All of this data collection is expensive and time consuming to carry out. The most basic models of the TCM include only a few explanatory variables in kereping with original conception of the model involving travel cost . But in an effort to examine the model thoroughly the individual decision process has led to the inclusion of an array of different variables.

The socioeconomic characteristics will include things like income, age, a measure of education, sex, race, and perhaps some measure of the subjective strength of preference for the particular type of recreation being offered.the socioeconomic characteristics of will depend on the type of the function. Since the cost of visiting a site consists of the transportation costs plus the costs of the time taken to get to the site and the time spent at the site, the role of time is critical to the estimation of travel costs. Time costs are included because time has an opportunity cost, for example, one could work instead. We need to know what elements of time are to be included in the travel costs, what money values to

use for these time costs, and how their inclusion will affect the demand and benefit estimates.

If time costs are ignored then benefits and demand will be biased, since for example, two visitors to a site may have had to travel different distances to the site whilst having equal money travel costs but requiring substantially different times to get to the site. Unless time costs are included, visitation rates may appear to be equal for the two zones and willingness-to-pay for the site will be equal. The effects of both time costs and money travel costs on visitation rates therefore need to be estimated separately, but since the two may be highly correlated asking separate estimation difficult, time costs are given a money value using some shadow price of time and lumped together with the transportation costs. Time at the site should also be included in travel costs because it may not be independent of the distance travelled. The shadow price of time at the site and time getting to the site may, however, be different. Any difference will be due to individuals deriving pleasure from the journey to the site, e.g., by taking a scenic route. If no pleasure or displeasure is forthcoming then the shadow prices are the same.(Cesario,1976)

The marginal wage rate is often used as an appropriate shadow price of time, since this reflects the opportunity cost of time between working and not working. However this trade-off may be distorted by institutional constraints such as maximum working hours, taxation etc.; or, using the wage rate may be inappropriate for certain groups such as the unemployed.

Exclusion of time costs in general, will result in a more elastic (flatter) demand curve and bias the benefit estimates downwards. Exclusion of on-site time costs, if they are not independent of distance travelled and vary inversely with it, will result in a less elastic

demand curve and an overestimate of benefits. In additon to what we have discussed, there are other variables such as environmental quality and substitiute sites .It was noted that an elegant trip generating function retains a careful balance between thoroughness statistical integrity and realism in the face of data requirements (Kenneth,1995)

Regarding the specificatio0n of the model ,the first step involved with the TCM is the creation of a trip generating function. The purpose of the trip generating function is to provide a model of site use. There are two types of functions one based on an individual model, the other zonal. Once the trip generating functions has been determined, it can be used to define a demand curve for the site A trip generating function estimating the number of visits to a site as a function of travel costs and the socio-economic variables is the first step in specifying a demand relationship. Specification of the functional form is crucial to the benefit estimates obtained. Standard statistical techniques will in general not be able to discriminate in favor of one specification or another. In practice the choice of functional form needs to be determined empirically on an individual study basis.

The second stage in specifying the demand relationship involves explaining the variation in visitation rates across sites according to site characteristics. One procedure for doing this is to use the two stage Varying Parameter Model of Smith and Desvousges [1986]. Here, a trip generating function is estimated separately for each site, without including any environmental quality variables as above. The second stage is then to explain the difference in the coefficients on the travel cost terms by regressing them on the environmental quality variables. The coefficient on the quality variable then shows how the demand curve shifts as quality of the site changes and thus can be used to estimate the benefits of a change. Using this second stage procedure also reduces the risk of

multicollinearity problems especially where sites possess multiple environmental attributes which may be highly correlated. Inclusion of such attributes as separate variables in a single stage estimation will lead to multicollinearity.

(c) Hedonic Pricing

Hedonic pricing (HP) derives from the characteristics theory of value developed by Lancaster (1966), Griliches (1971) and Rosen (1974), with the first HP studies being published in the late 1960s and early 1970s. The Hedonic approach is in fact similar to the Household Production Function approach since both require the weak complementarity assumption. The Hedonic approach differs in that it operates through private good price changes rather than private good quantity changes.

The Hedonic Pricing approach looks at markets in some private good for which the environmental good of concern is again a weak complement (or attribute), in order to infer individuals' preferences for environmental quality.

Given that different locations of property will have different levels of environmental attributes and that these attributes affect the stream of benefits from the property, then the variation in attributes will result in differences in property values (since property values are related to the stream of benefits). The Hedonic price approach looks for any systematic differences in property values between locations and tries to separate out the effect of environmental quality on these values. Consequently, the implicit prices found for environmental quality must be related to consumers' tastes and preferences in order to find

the attributes demand function (since the implicit price of the attributes reflect the forces of supply and demand).

To find the demand function relating the quantity of the environmental attribute to individuals WTP it is necessary to first define the market commodity (e.g. housing) and the environmental attribute of the market commodity (e.g. air quality). A functional relationship is then specified between the market price and all the relevant attributes of the market commodity. This is called a Hedonic Price function (UNEF,1998).

Conventional Market Approaches

Conventional market approaches are used in situations where the output of a good or service is measurable. These approaches use market prices (which may be adjusted by shadow pricing if market prices do not accurately reflect scarcity), or revealed/inferred prices (if no markets exist) to value environmental 'damage'. Where the damage shows up in changes in the quantity or price of marketed inputs or outputs, the value of the change can be measured by changes in the total 'consumers plus producers surplus'.

Two techniques may be distinguished: the dose-response technique and the replacement cost approach. In some instances, the Dose -Response Technique classified as production function -based approach.

(d) **The Dose-Response Technique**

This technique aims to establish a relationship between environmental damage (Response) and some cause of the damage such as pollution (Dose), such that a given

level of pollution is associated with a change in output which is then valued at market, revealed/inferred, or shadow prices. Where individuals are unaware of the impact on utility

of a change in environmental quality then direct WTP/WTA is an inappropriate measure and so dose-response procedures which do not rely on individuals preferences can be used (Hanley and Spash,1995).

The technique is used extensively where dose-response relationships between some cause of damage such as pollution, and output/impacts are known. For example, it has been used to look at the effect of pollution on health, physical depreciation of material assets such as metal and buildings, aquatic ecosystems, vegetation and soil erosion. The approach is mainly applicable to environmental changes that have impacts on marketable goods and so it is unsuitable for valuing non-use benefits. Damage actually done is found using a 'Dose-Response function' which relates physical/biological changes in the ambient environment to the level of the cause of the change. The Dose-Response function is then multiplied by the unit 'price' or value per unit of physical damage to give a 'monetary damage function' (Adams and Crocker,1991).

(e) The Replacement Cost Technique

This technique looks at the cost of replacing or restoring a damaged asset to its original state and uses this cost as a measure of the benefit of restoration. The approach is widely used because it is easy to find estimates of such costs. The approach is correct where it is possible to argue that the remedial work must take place because of some other constraint such as a water quality standard. Under such a situation the costs of achieving that standard are a proxy for the benefits of reaching the standard, since society can be assumed as having sanctioned the cost by setting the standard. However, if the remedial cost is a measure of damage then the cost-benefit ratio of undertaking the remedial work will

always be unitary. That is to say remedial costs are being used to measure remedial benefits. To say that the remedial work must be done implies that benefits exceed costs. Costs are then a lower bound of the true value of benefits.

2.2 Empirical Literature review

The next part takes a closer look at some selected case studies in an effort to illustrate the kinds of procedures needed to derive economic values. The study illustrates the different methodologies and elicit the various problems of applying those methodologies in the developing world. In recent years, a number of studies have applied various valuation techniques to value quality improvement on water and sanitation, air, valuing different products like forests and to value sanctuaries and parks. More has been done in this respect in the large number of CVM studies.

These CVM studies have identified determinants of household demand for improved environmental qualities. To mention some of the studies: Household demand for improved sanitation services in Kumasi, Ghana (Whittington, Lauria, Choe, Hughes, and Swama ,1993), Contingent valuation: water quality in Barbados and Uruguay (Tobias, and Mendelsohn 1991), Random utility model: water supply in Pakistan (Altat, Jamal, L.liu, Smith, and Whittington 1991), and willingness to pay for improved water supplies in Unitsha, Nigeria (Whittington, Lauria and Mu 1991). All these studies provides additional evidence that contingent valuation surveys can be successfully conducted in cities in developing countries and that useful information can be obtained on household demand for public services such as water and sanitation.

There are also various studies conducted in the areas of valuing Forest using Travel Cost Method and Contingent Valuation. These includes: Travel Cost Method, Valuing Ecotourism in a tropical rain forest (Mandelsohn 1991), Opportunity Cost Approach and Contingent Valuation: Forest functions in Madagascar (Kramer, Shyamsundar, and Munashinghe 1994) and contingent valuation in project planning and evaluation: The case of Social Forestry in Orissa, India, Kohl in 1999). Valuing Ecotourism in a tropical rain forest reserve findings show that the tourist valuation of the reserve can potentially exceed the competing alternative by a magnitude up to two times is indicative of a current bias in economic appraisal which largely ignores non-market benefits. The authors suggest that it is reasonable to assume the domestic valuation as a lower bound valuation by a foreign visitor who travels further and has fewer alternatives at home.

The main objective of this study is to value recreation benefits derived from Tis Issat Fall and give additional background for the establishment of national park in this area. In this connection, some studies which have direct relevant to the study are seen . This includes, the benefits and costs of Establishing a National Park in Madagascar (Kramer, Munasinghe, Sharma 1993), Contingent Valuation Environmental Policy: A case study of Lake Bogoria National Reserve, Nyangena 1997), Evaluation of Lumpinee Public Park in Bangkok, (Dixon and Hufschmidt 1986), and An economic and Ecological Analysis of the Bonaire Marine Park (Dixon, Scura and Shesthan 1994).

Several lessons can be drawn from these studies. These kind of researches have involved a survey of respondents, collection of data on various quantities and prices, and rigorous quantitative analysis. Researches of these kinds are time intensive. It is apparent that there is a strong need for a significant amount of pre-survey work to draft a useful survey

instrument. There is a need to focus groups and a format pre-test to sharpen the wording of the questions so that the desired information can be collected. Despite the effort required to collect the data gathered for these studies, the information obtained is critically important to implement conservation projects.

Concerning our country, there are some studies which were undertaken valuing environmental resources and their quality improvements. These comprise studies financed by Sida prepared by the Environmental Economics Unit at the Department of Economics Gotheborg University, and Master Thesis in the Addis Ababa University. Among these studies , Valuation of Community Forestry in Ethiopia: A contingent Valuation Study of Rural Households (Alemu 1997), The Economic loss of deforestation in Ethiopia : Contingent Valuation study in Welmera Wereda(Shemelis,1997), Economic Valuation of Environment Goods in Ethiopia: A Contingent Valuation Study of the Abiyata - Shalla Lakes National Park (Girma, 1998) Economic Valuation of Enviromental goods:As out Door Recreation using contingent valuation, a case study of Lake Tana (Shiferaw,1999),are found.

Among the above listed studies, a contingent valuation study of the Abiyata - Shalla Lakes and a case study of Lake Tana are more related to this study. The first study bases its research problem on controversy developed between the Ministry of Mines and Energy (MME) and the Ethiopian Wild Life Conservation Organization (EWCO) concerning whether the park be modified to allow for expanded production of Shalla Ash or preserved in its natural state. The study concludes that contingent valuation survey can actually measure values that are theoretically consistent and sufficiently reliable and which can be valued for use in benefit - cost analysis. And it calls for the integration of conservation of

park resources and Soda Ash development which in turn requires obliging soda ash producers to face the full social costs of their decisions through pricing, property rights and economic instruments (Girma , 1998).

Most of tourists who have come in Bahir Dar town have visited both Lake Tana and Tis Abay Water Falls recreation area. In this regard, the study conducted by Shiferaw (1999) is believed to be more relevant to our study. He used CVM to determine Economic Value of Lake Tana as out door recreation. The main objective of his study is to identify the determinants of the respondent's preference and then willingness to pay for out door recreational service obtained from the lake. The methods used were descriptive statistics, censored hetroscedastic Tobit model, multiple linear regression model and binomial probit model.

The regression result indicated that the most determinants of out door recreation fall in to two main categories i.e. the socio - economic characteristics of the respondent's, and the demographic as well as the physical attributes of the lake it self . The survey further shows that the optimal price in the three payment format is, Birr 45 per month for the case of "voluntary " monthly contribution per family and monthly entrance fee per family and Birr 5 per adult individual per visits for the case of daily entrance fee. The policy implications of the study was that, if the responsible service giving authority believe the protection of the Lake as a park to generate revenue sustainable from the users, the appropriate vehicle should be daily entrance fee payment vehicle, there is a need of revising the setting of optimal prices for the provision of the service at a specific price based on the willingness of the resource users.

The other more important study was Tis Abay II Hydroelectric project Environmental impact Assessment. The major focuses of this environmental assessment is the trade - off between the use of regulated River Abay for energy generation and the preservation of the water falls to sustain their aquatic diversity and value for a better domestic and international tourism. The final report concluded that "the comparison of benefits deriving from tourism and benefits deriving from electricity comes out quite strongly in favor of electricity. However, given;

- the underlying uncertainty concerning the benefits derived from tourism,
- the non-measured existence values that are generated by the falls,
- the added benefits of foreign exchange earnings and job creation associated with tourism and
- the loss in locally realised benefits that would follow a decision to allocate all water away from the falls

This comparison may not be as clear cut as it first appears. However, the project suggests that the best solution may involve following a policy of maximum electricity generation over the next ten years, and then reviewing the benefits that could be derived from tourism at the falls (MW R, 1997).

Most of the above studies have given emphasis on contingent valuation method. In addition to what have been done by most researchers, this study has attempted to apply Travel Cost Method. Many authors' have used both methods to value recreational /wilderness resources (Hanley etal 1995) The result of the two methods could help evaluate reliability of the two methods. So one important value added of this study is to indicate the extent to which the two methods for evaluating a given environmental change produce

similar results. The second contribution of this study related to environmental impact analysis of Tis Abay Water Falls Hydro Power Project II, and has two dimensions. First, this study has tried to estimate value of recreation site including the existence value which was not treated in the impact assessment. Second, this study could help to evaluate the repeatability of the results.

3. Descriptive Statistics Analysis

3.1. The Socio- Economic and Demographic Characteristics of the Sample

This section briefly discusses the socio-economic and demographic characteristics of the respondents. The sample of this study includes both visitors and potential visitors. In addition to this, some households who are nearby the resource were also covered by the survey. Therefore, this summarizes question on demographic and socio - economic characteristics of the respondents, such as sex, marital status, age, educational level and income.

From the surveyed respondents, 72.1 % are male and the rest (27.9 %) are females. The proportion of female respondents is lower in potential visitors and domestic visitors while in the case of foreign visitors the proportion of female and male shows insignificant variation. Other demographic characteristics is age, which is presented in Table 3.1.

Table 3.1 Age distribution of the sample

Age group	Potential Visitors (%)	Visitors (%)		Total (%)
		Domestic	Foreign	
< 20	2.3	0	1.5	1.6
21 - 30	38.5	25.5	17.1	30
31 - 40	42.3	44.7	25.7	38.1
41 - 50	15.4	21.3	27.1	19.8
51 - 60	1.5	8.5	17.1	7.3
60^{+}	0	0	11.5	3.2
Total	**100**	**100**	**100**	**100**

Source:- Computed from sample survey results

As was indicated in Table 3.1, 30%, 38.1% 19.8% and 7.3% of the respondents are aged between 21-30, 31-40, 41-50 and 51-60 respectively. Respondents which are under 20 is only 1.6% where as those which have age above 60 represents 3.2% of the sample. Accordingly, the majority of the respondents (87.9%) are between 20 and 50 years of age. When we look this age group across the components of the sample, this percentage is higher in potential visitors (96.2%) and followed by domestic visitors (91.5%). Low proportion of respondents below the age of twenty can be attributed to the restriction we made to potential visitors to age of 18 years and above.

Regarding marital status of the respondents, it was found that 51.8% are married. This percentage remains almost constant in all sample areas. The second largest proportion is (38.1%) those which are not married / single. In addition to this, divorced and widows have 6.9% and 3.2 percent respectively.

Table 3.2 Educational level of the Respondents

Educational Level	Potential visitors (%)	Visitors (%)		Total (%)
		Domestic	Foreign	
≤Primary	1.6	2.1	1.4	1.6
Secondary	21.5	12.8	7.1	15.8
Diploma	26.9	29.8	25.7	27.1
First degree	32.3	40.4	31.5	33.6
Second degree and above	17.7	14.9	34.3	21.9
Total	**100**	**100**	**100**	**100**

Source:- Computed from sample survey results

24,000. The cross tabulation result indicates the same results that were observed as the case of local respondent's.

3.2. Issues and importance of preserving the Tis Abay Water Falls

Obviously, not all respondents would have similar attitude and perception about environmental resources in general and Tis Abay Water Falls in particular. To gauge respondents attitude towards nature based environmental resources, they were asked how they attach importance for establishment of the Tis Abay Water Falls Park and to what extent they consider the preservation of the resource is worth for discussion and the results of these questions are presented in the following tables.

Table 3.5 **The Importance of the establishment of the park to the economy**

S/N	Responses	Potential visitors (%)	Visitors (%)		Total (%)
			Local	Foreign	
1	Very important	54.5	72.3	57.1	58.4
2	Fairly important	39.5	21.3	22.9	31.6
3	Fairly unimportant	4.5	4.3	14.3	7.2
4	Not important	1.5	2.1	5.7	2.8
	Total	**100**	**100**	**100**	**100**

Source:- Computed from sample survey results

The survey result indicates that, 90% of the respondents said that establishment of the park is very and/ or fairly important to the regions/ country economy, while the rest (10%) of

them said it is fairly unimportant and/or not important. The percentage of the respondents who said it is very important and/ or important are equaly distributed between potential visitors (94%) and domestic visitors (93.6 %), but there is slight difference in the case of foreign visitors (80%). Likewise, there is no noticeable difference those who said it is not important between potential visitors (6.0%) and local visitors (6.4%) while there is significant difference observed in foreign visitors (20%).

Table 3.6 Order of importance attached to the benefit and issues of concern towards Establishment of the park

	Benefits	**Potential visitors (%)**	**Visitors (%)**		**Total (%)**
			Domestic	**Foreign**	
1	Employment	9.0	4.3	22.9	12.0
2	Recreation	24.1	31.9	17.1	23.6
3	Preservation	53.4	57.4	51.4	53.6
4	Others	13.5	6.4	8.6	10.8
	Total	**100**	**100**	**100**	**100**

Source:- Computed from sample survey results

In relation to this, the respondents were also asked to rank in order of importance the benefits and issues of concern to the consequences of the creation of the park. As was indicated in Table 3.6, 53.6%, 23.0% and 12% of the respondents have given priority to

preservation of cultural /natural heritage of the country, recreation and employment respectively. Accordingly, the majority (53.6%) of the respondents said that the most important reason for establishment of the park is due to value given to preserving the resource for future generation. In this regard, there is no noticeable difference of the percentage distribution between potential visitors and visitors. The recreational value was given the second rating. There were also some respondents (10.8%) who have given priority for "different" reasons such as the source of foreign exchange, revenue generation and so on. When we look across the respondents responses to the above "other" reasons there is some variation between potential visitors (13.5%), foreign visitors (8.6%) and domestic visitors (6.4%).

Both potential visitors and visitors were also asked to indicate their extent of consideration to the preservation of the resource is worth for discussion. The responses of the respondents to this question are summarized in Table 3.7.

Table 3.7 Concern of the respondents to preservation of the resource

S/N	Responses	Potential visitors (%)	Visitors (%)		Total (%)
			Domestic	Foreign	
1	Serious problem	45.9	55.3	45.7	47.6
2	Fairly serious problem	30.1	29.8	35.7	31.6
3	Not a very serious problem	19.5	14.9	14.4	16.4
4	Not important at all	4.5	0	7.2	4.4
	Total	**100**	**100**	**100**	**100**

Source:- Computed from sample survey result

Concerning the problem about the preservation of the water falls, 47.6% and 31.6% of the respondents have said it was a serious problem and fairly serious problem respectively, while 20.8% have said not a very serious problem and/or not important at all. Accordingly, majority (79.2%) of the respondents have considered the preservation of the resource is at least an issue of problem and worth for discussion. This percentage is almost fairly distributed between potential visitors and visitors.

Those respondents who considered the preservation of the park as serious problem, they were further asked to state causes they feel probably the most problematic to establish the park. More than 58.0% of the respondents in this category have said that resource use

conflict around Tis Abay Water Falls is an issue of serious problem. This proportion exhibits insignificant difference between foreign visitors (59.8%), domestic visitors (57.7%) and potential visitors (57.4%). In addition to this, 16.8% and 22.7% of them have said that displacement of people in the surrounding and high preservation cost are reasons that could make the establishment of the park an issue of serious problem respectively. Accordingly, the most important reason was competing resource use around Tis Abay Water Falls and followed by high preservation cost.

Table 3.8 Reasons to consider preservation of Tis Abay Water Falls as an important issue

S/N	Major reasons	Potential visitors (%)	Visitors (%)		Total (%)
			Domestic	Foreign	
1	Resource use conflict around Tis Abay Water Falls	57.4	57.7	59.4	58.0
2	Displacement of people in the surrounding	16.4	30.8	6.2	16.8
3	High preservation cost	24.6	7.7	31.3	22.7
4	Others	1.6	3.8	3.1	2.5
	Total	**100**	**100**	**100**	**100**

Source:- Computed from sample survey results

4. Contingent Valuation Method ; empirical results and discussion

4.1. Valuation and Estimation of the Economic Benefits of the Tis Abay Water Falls

It was argued that, if contingent valuation surveys were successfully conducted useful information could be obtained on household demand for public services or environmental goods. Therefore, in this study contingent valuation method was used directly to estimate the value of Tis Abay Water Falls National Park for potential users and visitors. Both potential visitors and visitors were provided with information about the establishment of Tis Abay Water Falls Park and using dichotomous and open ended questions format, they were asked their willingness and if so how much they are willing to pay for preservation of the resource.

This study used "Voluntary" tax or contribution and entrance fee payment vehicles to estimate maximum willingness to pay for establishment of the park. Thus, the willingness to pay for the case of both dichotomous and open ended questions are grouped into two willingness to pay formats. These are "Voluntary" contributions or tax per family (WTP tax) per annum and daily entrance fee per adult per visit (WTP fee).

The first format used to elicit valuation was discrete (dichotomous) question. For dichotomous choice, the willingness to pay was obtained by asking the respondents as to whether or not he/she would be willing to pay for the establishment of the Tis Abay Water

Falls Park. This question was presented to both potential visitors and visitors. For the case of potential visitors, the respondents were asked their willingness to pay the "voluntary" tax or contribution per family, while visitors were also asked to state their willingness to pay new entrance fee.

Open ended question was the second elicitation format which was used to estimate maximum WTP. In the case of first willingness to pay format (WTP tax), respondents of potential visitors were asked to state the maximum amount they would be willing to pay in the form of "voluntary" tax or contributions per household per annum for the creation of Tis Abay Water Falls National park, so that it remains an important component of Ethiopia's tourism potential. In the second case, the visitors were asked to indicate the maximum entrance fee they would be willing to pay to visit Tis Abay Water Falls as a park fee which would reflect cost of providing park services and the opportunity cost of preservation of water falls.

The responses of the respondents for first alternative willingness to pay format (WTP tax) was summarized and presented in the table 4.1. The table indicates estimation of the distribution and ranges of WTP bids for "voluntary" tax or contributions (WTP tax). Accordingly, under the first scenario, the majority (84.8%) of the surveyed respondents are willing to pay at most 100 Birr per annum per household for establishment of the park or preservation of the resource. The rough estimation indicates that the mean willingness to pay for creation of Tis Abay Water Falls National Park under "voluntary" tax or contribution format is about Birr 51.60 per household per annum.

Table 4.1 Distribution of willingness to pay per household per annum

(the case of WTP tax)

Intervals for WTP tax bids per annum	WTP tax mid points	Relative frequancy (%)
0 - 20	10	31.9
21 - 40	30	20.3
41 - 60	50	17.4
61 - 80	70	4.3
81 - 100	90	10.9
101 - 120	110	5.8
121 - 140	130	2.9
141 - 160	150	2.2
160^{+}	170	4.3
Total		**100**

Source:- Computed from sample survey results

Table 4.2 also shows estimation of the distribution and ranges of WTP bid for the case entrance fee. Accordingly, 87.1% of the sample of visitors are willing to pay not more than Birr 100 per visit as a park fee. Only 12.9% of the surveyed visitors are willing to pay more than Birr 100 for the preservation of the resource. The mean willingness to pay for preservation of Tis Abay water falls under park fee format is roughly estimated to be Birr 54.20.

Table 4.2 Distribution of willingness to pay (for the case of WTP fee per visit)

Intervals for WTPfee bids per visit	WTP mid points	Relative frequancy (%)
0 - 20	10	39.4
21 - 40	30	8.8
41 - 60	50	16.9
61 - 80	70	6.6
81 - 100	90	15.3
101 - 120	110	2.2
121 - 140	130	4.4
140 - 160	150	2.9
160^{+}	170	3.5
Total		**100**

Source:- Computed from sample survey results

4.1.1. Estimation of the total willingness to pay

Estimation of the total willingness to pay revolve around issues like the choice of the relevant population, moving from sample mean to a mean for the total population and the choice of the time period over which benefits should be aggregated. In this study, the aggregation of the maximum willingness to pay responses of the sample adjusted for the total number of households who reside in the selected six towns for the case of WTP tax.

And summation of the total willingness to pay for the case of WTP fee is based on the number of 1998/99 both domestic and foreign visitors.

The total economic benefits of the park can be calculated using the frequency distribution of willingness to pay bids. The total willingness to pay (WTP) for the case of "voluntary" tax or contributions and entrance fee was then derived according to the following formula:- (Dixon and Hufscmidt, 1986):-

$$TWP_i = \sum_{i=1}^{m} AWP_i \left(\frac{n}{N}\right) (P)$$

Where TWP = Total willingness to pay

AWP_i = Average willingness to pay, amounts i through m

n_i = Number of respondents willing to pay AWP_i

N = Total number of people interviewed

m = The last range of willingness to pay bid

P = Total population of the study

i =Payment vehicles

The total population for the case of WTP tax is the total number of households (693115) in the selected six towns for the year 1999, while for the case of WTP fee the total population (15831) is defined as domestic and foreign visitors for the year 1998/99. Therefore, total willingness to pay for the park is estimated by multiplying the frequency distribution of the sample by the total population which was defined earlier. The total economic benefit of the park requires the summation of all average willingness to pay. Based on the definition of total population of the study and formula defined earlier, the total willingness to pay for establishment of the park under tax payment vehicles is presented below.

Table 4.3 Total willingness to pay for the establishment of the park (for the case of WTP tax)

Frequency distribution	Total population	WTP mid points in Birr	Total WTP for the park benefit (Birr per year
31.9	221104	10	2,211,040
20.3	140702	30	4,221,060
17.4	120602	50	6,030,100
4.3	298804	70	2,086,280
10.9	75550	90	6,799,500
5.8	40200	110	4,422,000
2.9	20100	130	2,673,000
2.2	15249	150	2,287,350
4.3	29804	170	5,066,680
Total	**693115**		**35,797010**

Source:- Computed from sample survey results

As is indicated in Table 4.3 the total willingness to pay for economic benefit of the park under "voluntary" tax or contribution is estimated to be Birr 35, 797,010 per annum. The estimation of the economic benefit of the establishment of the park under fee payment vehicle also presented in the table 4.4.

Table 4.4 Total willingness to pay for economic benefit of the park

(for the case WTP fee)

Frequency distribution	Total population	WTP mid points in Birr	Total WTP for the park benefit (Birr/day)
39.4	6237	10	62370
8.8	1393	30	41,790
16.4	2675	50	133,750
6.6	1045	70	73,150
15.3	2423	90	218,070
2.2	348	110	38,280
4.4	697	130	90,610
2.9	459	150	68,850
3.5	554	170	94,180
Total	15831		821,070

Source:- Computed from sample survey results

Accordingly, the total willingness to pay for establishment of the park's economic benefit under entrance fee payment scenario was estimated to be Birr 821,070 per day, per visitor .The economic benefits estimated under entrance fee is much higher than "voluntary" tax or contributions. This may be attributed to the problem of strategic bias in the case of "voluntary" tax or contributions.

4.1.2 Estimation of the Expected Revenue

As was discussed in earlier chapters contingent valuation method is a survey method for assessing monetary value that is particularly useful for items which have no objective market price. This would help to estimate of marginal social benefit and costs of non - market goods and aims explicitly to take environmental values into account.Here, it was necessary to distiguish between economic benefits and revenue. The term " the total economic benefit " of the resource often defined as the total willingness to pay where as " revenue" is the financial return that can be earned by the entity providing the specified level of service at a price. In this study the frequency distribution of willingness to pay (WTP) bids was used to provide a rough estimate of the revenue that might be expected from providing the good or service at a specified price.

The first step to estimate the total revenue is to choose the relevant population i.e. the total number of households or individual users that would be willing to pay for the establishment of the park at a specific price. After identifying the relevant population the next step would be multiplying the number by the price. It was argued that the choice between mean or median could affect in aggregating individual valuation responses. In most cases, the analysts will wish to summarize respondents answers to valuation in terms of the mean willingness to pay for the good or service. In this study, the willingness to pay mid points or average willingness to pay was used as a proxy for the price.

Table 4.5 Expected Revenue (for the Case of WTP tax)

Frequency distribution	Percentage of households using the servise	Households using the service at different price	WTP mid points	Expected revenue Birr/annum
31.9	100	693115	10	6931150
20.3	68.8	472011	30	14160330
17.4	47.8	331309	50	15665450
4.3	30.4	210707	70	14749490
10.9	26.1	180903	90	16281270
5.8	15.2	105353	110	11588830
2.9	9.4	65153	130	8469890
2.2	6.5	45052	150	6757800
4.3	4.3	29804	170	5066680

Source:- Computed from sample survey results

Table 4.5 shows expected revenue for "voluntary" tax or contributions payment vehicles. Accordingly, under this scenario the maximum revenue is obtained at Birr 90 per household per annum. At this optimal price the maximum revenue is estimated to be Birr 16,281,270 per year.

The maximum revenue estimation under entrance fee payment scenario is presented at table 4.6. It shows that the optimal price that yields maximum revenue is Birr 50 per

individual per visit. Accordingly, the total expected revenue is estimated to be Birr 410,000 per day.

Table 4.6 Expected Revenue (for the Case of WTP fee)

Frequency distribution	Percentage of Households using the service	Households using the service at different price	WTP points	Expected revenue Birr/visit
39.4	100	15831	10	158310
8.8	60.9	9641	30	289230
16.9	51.8	8200	50	410000
6.6	34.9	5525	70	386750
15.3	28.3	4480	90	403200
2.2	13.0	2058	110	226380
4.4	10.8	1710	130	222300
2.9	6.4	1013	150	151950
3.5	3.5	554	170	94180

The comparison of the expected revenue under these two payment vehicles indicates that total expected revenue for the case of WTP fee is much higher than WTP tax . Accordingly, total expected revenue under WTP fee is Birr 12,300,000 per month while in the case of WTP tax is Birr 1,356,773 per month. The main reason is that population of visitors considers both domestic and foreign visitors, but for the case of potential visitors treats only domestic users.

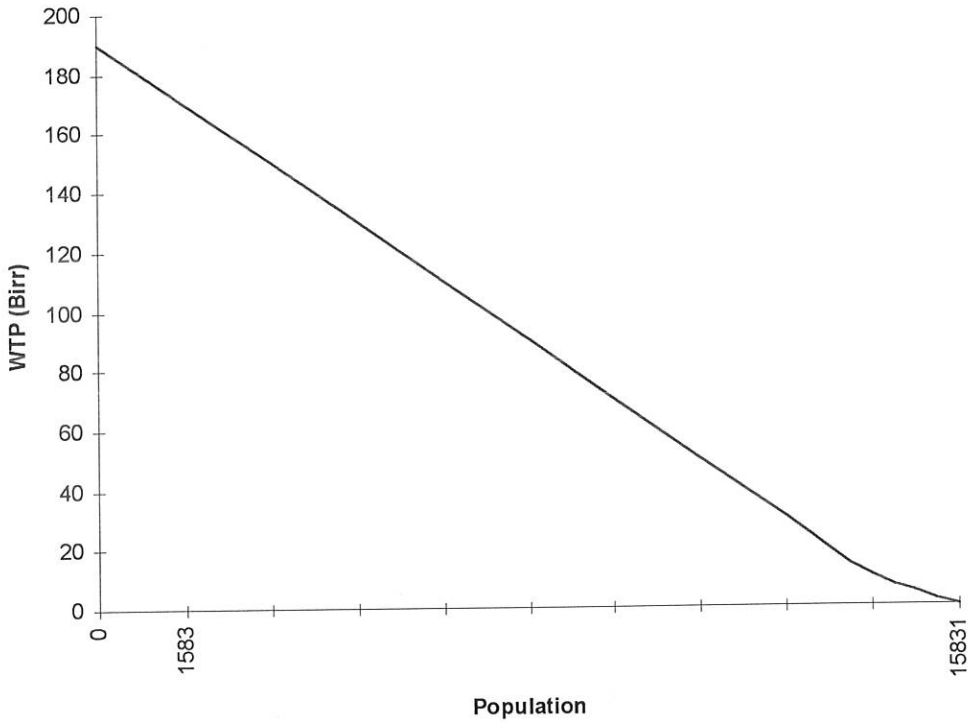
4.1.3 Derivation of Aggregate Demand and Estimation of the Consumer Surplus

The contingent valuation techniques starts with the individual perception of change. Once values for a representative set of people have been determined, they are aggregated to a total value directly depending on the number of individuals affected. In this study, the willingness to pay (WTP) responses were averaged and generalized to actual users population to get an estimate of aggregate WTP for establishment of Tis Abay Water Falls National Park from this we derived aggregate demand curve for the park.

There are different way to summarize the desired distributional information and to estimate aggregate demand which is directly available from a contingent valuation survey. Mitchell and Carson (1987), have used percentage of respondents willing to pay various amounts for a public good. This is one of the most understandable ways summarizing this information which prepares a graph of Birr amounts by the percentage of the public good in question. According to Davis (1963), aggregate demand curve derived by plotting maximum willingness to pay bid against total respondents. The observations were expanded by the sampling fraction to account for the total number of users during the recreation seasons. Then, the arrayed the user population by willingness to pay, and built accumulative distribution downward from the upper limit of distribution.

In this study, aggregate demand for the case of entrance fee payment vehicles was derived. The aggregate demand schedule is derived using the maximum willingness bids and total number of visitors population. Accordingly, the vertical axis measures the maximum bid per respondents and the horizontal axis measures the total population. Therefore, willingness to pay mid points used as a proxy for price.

Figure 1 Estimate of the Aggregate Demand Curve



The above graph depicts the relationship between the willingness to pay as a park fee and number of visitors. Accordingly, the numbers of visitors who are willing to pay a particular prices falls as the price they are asked to pay increases. Therefore, any point on the curve shows all the visitors who would not bid more than the point on the vertical axis.

The derivation of aggregate demand schedule would help to estimate the gross value of the consumer surplus. It was noted that the difference what people would be willing to pay for

a good or services and what they actually pay is known as consumers surplus. CVM technique rely on standard neo- classical economic principles and use either of two Hicksian measures of consumer surplus i.e. compensating variation (CV) or equivalent variation (EV). And the area under the demand curve represents the gross value of consumers'. Therefore, based on the above graph the gross value of consumer surplus from the establishment of the park was estimated.

The gross consumer surplus from establishment of the park is estimated Birr 871, 745 per day or 318,186,425 per annum. Capitalized at 10.5 percent discount rate the estimates yield a present value Birr 3,030,351,686 per annum. Since the park's recreational benefits can occur indefinetly the capitalization formula calculates that value of those benefits using a given discount rate. This estimates would help to place minimum value on the creation of Tis Abay Water Falls park. Uncertainty of future events, population pressures increase and considering the existence of the intrinsic rights of future generation, one would expect that the value of the gross consumer surplus will be come relatively more useful. Therefore, Tis Abay Water Falls can be considered a valuable environmental resource because there is a large area of consumers' surplus or welfare gain associates with establishment of the park.

4.1.4 Protest Bids

Some authers argue that a "good" CVM" study should identify protest bids. In addition to the problem of invalid large responses a sample could contain invalid zero responses, so called protest zeros. Protest zeros occur when respondents reject some aspect of the constructed market scenario by reporting a zero value though they place a positive value on the amenity or resource being valued. Some means must be found to identify protest zeros for deletion before applying the procedure for deleting outliers. One approach is to ask every respondent who gives a zero value to indicate a reason for doing so (Freeman III, 1993). Accordingly, reasons given for protest bids in CVM surveys are often revealing with regard to the success with which CVM survey has been designed (Hanlay and Spash, 1995).

In order to identify protest bids, this study has attempted to evaluate reasons for zero bids. The survey result shows that 14.7% and 7.1% of the respondents refused to pay for the case of "voluntary" tax or contributions and entrance fee payment vehicles respectively. Major reasons for unwillingness to pay for the two scenarios are presented in the following tables.

Table 4.7 Major reasons for refusal for the case of WTP tax

S/N	Major Reasons for refusal	% of total
1	Lack of income /cannot afford	4.7
2	Conflicting resource use should be resolved	2.0
3	There is no need to establish national park	2.7
4	I only give priority to energy generation	2.7
5	The local government should pay	2.7

Source:- Computed from sample survey results

As was indicated in the above table, the major reasons (4.7%) of respondents for unwilling to pay is that they could not afford to do so. Other reasons are conflicting resource use should be resolved (2.0%), giving priority to energy generation (2.7%) and there is no need to establish national park (2.7%) . All the above responses might not be treated as a protests, and such respondents demand depend on the ability to pay and taste. In other direction, 2.7% of respondents stated that they refused to pay because the local government should pay (2.7%).This would be classified as protest zeroes. Whilst such respondents might care about the preservation of Tis Abay Water Falls but, they think that the service should be provided by the state or at zero cost. So, under "voluntary" tax scenario protest bids constituted only 2.7% of responses.

Table 4.8 Major reasons of refusal for the case of WTP fee

S/N	Major Reasons for refusal	%
1	Access to the park should be free	2.9
2	Lack of income	2.1
3	The regional government should pay	0.7
4	Alternative use of the resource is preferable	1.4
	Total	**7.1**

Source:- Computed from sample survey result

According to the above table, under entrance fee scenario the major reasons for unwilling to pay is access to the park should be free (2.9%) which is followed by lack of income (2.1%). Almost 1.4% of the respondents have reasoned that alternative use of the resource (energy production) is preferable. Only .07% of the respondents have given reason that regional government should pay. In this case insignificant proportion can be classified as protest zeroes.

4.1.5. Estimation of Minimum Willingness to Accept Compensation for the Establishment of the Park

Considering contingent valuation method, WTP and WTA bids are theoretically justified on the ground that they are approximation for the Hicksian variation and surplus measures. WTP and WTA are the two measures of welfare change and the choice of welfare measures are subject to empirical works. As was discussed in the literature survey part

contingent valuation method (CVM) works directly soliciting from a sample of consumers their WTP and \or WTA for a change in the level of environmental service flows, in a carefully structured hypothetical market.

Accordingly, WTP measures give an estimate of CV compensating variation for welfare-improving moves and equivalent variation for welfare decreasing moves. WTA replies give information about compensating variation for welfare decreasing moves and equivalent variation for welfare increasing moves. But, the issue surrounding WTP and WTA formats are not settled. There are some reasons to believe that WTA should be used when individuals are forced to give up something or suffer from some damages. Similarly, WTP is the appropriate measures when an individual is being asked an improvement from the present state.

Like other parks, the prior expectation concerning establishment of Tis Abay Water Falls National Park is that it will pose an economic cost on the local population /villagers interms of their prohibition uses of the resource it contains. Based on this we can hypothesis that the creation of the Tis Abay Water Falls park could result welfare losses to nearby villagers. This study attempted to determine "lossers" willingness-to-accept compensation to forego resource uses in the proposed national park.

This CVM survey also contains questions which would give information about the estimation of WTA bid. Before the survey was carried on villagers which have access to the resource was iddentified. It was found that not more than 30 households have land

holdings in the proposed national park area. Average land holding of the household is estimated to be less than half hectare These villagers used the land for cultivation of millets, maize, teff, oil seeds and sugar cane, also some part of the holdings used for grazing. It was also identified that some of the users are settled out side the proposed park area. Accordingly, if the park is established these villagers will lose those products harvested or grown in the park lands. In this regards it is an economic cost to villagers. It was also important to mention here that in the proposed park area there is a remnant of natural forest is under preservation by local government. And it was believed that in attempt to preserve the natural forest might hampered further settlement of nearby villagers.

After identifying potential victim of the proposed national park, 10 households were asked to state their reaction to the establishment of the park in order to estimate the cost that would incurred by the local residents. Accordingly, 60% (6) of the households have said that they would support and the remaining 40% (4) said that they would not support the creation of the park. Those respondents who did not support the proposal, they were also asked to give their reasons for not supporting the establishment of the park. The response to this question is that losing access to the park area and the resource it contains such as land is the main cause for not supporting the proposal.

The next question presented to this group of respondents is that to express their willingness to give up their land and to accept compensation which would make them as well off with park as they would have been if they continued to access to the park..

From six households 83.3% (5) were unwilling to give up their land and only 14.5% (1) was willing to give up his land for the park. Therefore, the response of one household would not be sufficient for estimation WTA bid function. But, from background information we have collected and limited survey results there is a room to make general conclusions about the cost that would incurred by local population.

Accordingly, due to small amount of human settlements with in the proposed park boundaries, some of the household settled in close proximate, and limited coverage of the proposed park area, we can say that benefit that would lost as a result of the creation of the park is not significant problem. Even though, the cost that would borne by villagers is small this does not meat that displacement of nearby residents should not be given emphasis. The responses of the households of not giving up their land has signal that careful attention has to be given to protesters in order to incorporate their needs. This is because implementation of project proposal asks involving active participation of local residents.

4.2 Model specification and Regression Results

4.2.1 Model specification and hypotheses

The contingent valuation questions are designed to reveal willingness to pay (WTP) or willingness to accept (WTA) for the preservation or establishment of the national park. The respondents were asked different questions about how much they would be willing to pay (WTP) to ensure a welfare gain from a change in the establishment of the park or how much they would be willing to accept (WTA) in compensation to endure a welfare loss

from the establishment of the park. The interviewee would include both users and non-users of the resources.

The WTP/WTA can be used to measure and represents Hecksain Compensating Variation, since it leaves the respondent at the same utility level after the suggested establishment of the park. A bid curve can be estimated to investigate the determinants of WTP bids. Our prior expectation is that WTP can be estimated using the following model.

$$WTP_i = f(Ag, Agsq, Ed, HI, FS, Att, Tast, Ass, TPv, Bis, TTp, Ts, U_i)$$

Where

WTP = Willingness to Pay for establishment of the park

Ag = The age of the respondent

Agsq = The age square of the respondent

Ed_2 = 1 If the respondent has attained secondary level of formal education

= 0 Otherwise

Ed_3 =1 If the level of formal education of the respondent is Diploma

= 0 Otherwise

Ed_4 = 1 If the respondent has First Degree and above

= 0 Otherwise

HI = Household monthly income in Birr

Fs = Family size of the respondent

Att = Attitude of the respondent towards the establishment of the park

=1 If the respondent consider the establishment of the park important to Region's economy

= 0 Otherwise

Tast = Respondent's Preference and value to Tis abay water falls

= 1 If the respondent attaches total economic value to the Tis Abay water falls

= 0 Otherwise

Ass = Availability and visit to substitute sites

=1 If the respondent has visited other recreation sites

= 0 If the respondent has not visited other recreation sites

TPv = Primary purpose of visit

=1 If the respondent's Primary purpose of visit is Tis Abay water falls

= 0 Otherwise

Bis = Benefit and issues of concern

= 1 If the respondent give priority to the preservation of cultural heritage of the country

= 0 Otherwise

TTp = Tourist type

= 1 If the respondent is domestic Tourist

= 0 If the respondent is foreign Tourist

Ts = Time spent on the site

= 1 If the respondent's time spent on the site is 3 hours and above

= 0 If the respondent 's time spent on the site is less than 3

U_i = Error term

i = Payment vehicles (taxes or fee)

Hypotheses

A hypothesis is a statement (not a question) about an expected relationship between one or more independent variables and from prior identification of functional relationship and expected sign of explanatory variables will be based on economic premises, what have been already established. After defining all potential explanatory variables that might affect the dependent variable in the above model, we examined under what conditions the hypothesis is expected to be true.

The expected sign of explanatory variables used in the contingent would be based on the type of vehicle chosen for payment (tax or fee) and whether WTP/ WTA used as measures of economic value.

The hypothesized determinants of the WTP typically include socio-economic and demographic characteristics of the respondents, taste, attitude and availability of substitute goods and services. Accordingly, income and education are positively correlated with WTP. Age has non-linear relation to WTP, i.e. up to some age level the WTP for recreational service increases, but beyond that level of age the WTP decreases. Family size (FS) is expected to have a negative relation with WTP i.

Availability and visit of other recreational sites is negatively related with WTP. Attitude and Taste would have positive relation with WTP becaue respondent's which have positive attitude and high preference to the Tis Abay Water Falls recreational service would like to pay higher value.

The type of visitors is expected to have a positive relation with WTP since the domestic visitors have additional benefit than foreign visitors. Primary purpose of the visit is also expected to be positive, because those for whom a visit to the site is the sole purpose of trip would give high value to the recreation area. Lastly, time spent on the recreation site would have a positive relation with WTP.

4.2.2 Estimation and Analysis

In this study multivariate analyses of the determinants of WTP responses approach is used to estimate a valuation function that relates the hypothesized determinants with the WTP responses. As it was discussed earlier open-ended questions will give a continuous measure of WTP for the good or service such that Ordinary Least Squares (OLS) models can be used to explain the variations in the dependent variable. For dichotomous choice questions the responses are discrete and so OLS is unsuitable for estimation of the valuation function. Instead a variety of discrete choice models are available to explain the probability that a respondent will give a yes response to the valuation question.

Based on the nature of data and types of elicitation methods and payment vehicles three econometrics models were selected. In this study, open - ended questions which give a continuous measure of WTP are estimated with OLS and Tobit models, where as probit

model is used to estimate dichotomous choice questions responses. That is, WTP under fee payment vehicle analysed with OLS and WTP under tax scenario analysed with Probit and Tobit models. The estimation of these three models results are presented below.

4.2.2.1 Multiple Linear Regression

The payment scenarios, which were used in this study, are "voluntary" contribution taxes and daily entrance fees. In an attempt to explain the willingness to pay amounts, bid curves were estimated for both WTP taxes and WTP fees. Multiple linear regression was used to estimate for WTP fee alone, since WTP fee in addition being continuos had few (7%) zero bid responses.The model is :

$$WTP_i = \beta_0 + \beta_1 Ag + \beta_2 Agsq + \beta_4 Ed_2 + \beta_5 Ed_3 + \beta_7 Ed_4 + \beta_8 HI + \beta_9 Fs + \beta_{10} Att + \beta_{11} taste + \beta_{12} Ass + \beta_{13} Bis + \beta_{14} TTp + \beta_{15} Tpv + \beta_{16} Ts + u_t$$

Where

u_t is an error and omission term to capture unexplained variables and the other variables remained as defined previously. The multiple linear regression results for WTP fee is given in the following table .

Table 4.9 **Multiple linear regression results for WTP fee** *

Variable	Coefficient	Standard Error	t-ratio
Constant	11.79838150	28.407474	.415
AGE$^{\phi}$	-.1533461328	0.07803866	-1.965
AGSQ	.4506911213E-02	.18540104E-01	.243
ED2$^{\phi}$	5.274995416	2.2865172	2.307
ED3$^{\varphi}$	11.87187638	5.9005341	2.012
ED4	17.90686069	12.675438	2.671
HI$^{\Psi}$	.1961785965E-02	.60564505E-03	3.239
FS$^{\varphi}$	-2.073967122	1.2315719	-1.086
ATT$^{\varphi}$	13.40317022	7.9569684	1.684
BIS	1.241812292	6.2189119	.200
TAST$^{\Psi}$	12.26924771	5.8238516	2.106
TTP	-8.392232127	16.320462	-.514
TPV	.5119130411	7.6820340	.067
ASS$^{\Psi}$	-1.490105235	0.7136520	-2.088
TS	3.391783286	6.3934808	0.531

Mean= 53.72992701 , S.D.= 57.98218586
R-squared= .543376, Adjusted R-squared = .49098
F[14, 122] = 10.37, Prob value = .00000
Autocorrel: D-W Statistic = 1.80486, Rho = .09757
Results Corrected for heteroskedasticity
Breusch - Pagan chi-squd = 277.5974, with 14 def freedom

φ Significant at 10%, ϕ Significant at 5%,

Ψ Significant at 1%

- The results are heteroscedasticity adjusted

It was noted that heteroscedasticity arises in numerous application, primarily in the analysis of cross section data and posses potentially severe for inference based on OLS.

Therefore, it is useful to be able to test for heteroscedasticity. Different type of test of heteroscedasticity have been suggested. Among them Limdep will report Breush-Pagan Langrange multiplier test of heteroscedasticity. It has been argued that the Breush-Pagan-Langrange multiplier test is quite sensitive to the assumption of normality. Under normality, this modified statistic will have the same asymptotic distribution as the Breush-Pagan Statistic, but absent normality, there is some evidence that it provides powerful test (Green, 1997).

The table reports the Breasch - Pagan multiplier test of heteroskedasticity. In the out put above the value of the statistic is indicates that there is heteroscedasticity.

The adjusted R^2 was 0.49, which indicates that more than 49%, the variation in visitor's willingness to pay per visit is explained by the explanatory variables included in the model. Also, F - test of the joint significance test of the regression [F(14,122) = 10.32] rejects the null hypothesis that the regression coefficients are insignificantly different from zero.

The estimated bid curve shows the direction of relationship and statistical significance of WTP fee and its determinant variables. Accordingly WTP fee is positively and significantly related to education, household income, attitude and taste. These results confirm to our prior hypothesised relationships. Other variables such as family size, availability of substitute sites and age are negatively and significantly related to dependent variable. The sign on age variable indicates that younger people, on average valued

preservation of site more highly. The variables like time spent on the site, age squared, tourist purpose of visit and benefit and issues are positive but insignificant.

4.2.2.2 The Probit Model

The second econometrics model, which is used to analyze responses of respondents, is probit model.. Probit treats dichotomous responses variables. It is argued that such responses must be analyzed using a binary response techniques such as logit analysis in order to derive an average value for WTP. The most popular model for binary data is logistic regression (Agresti, 1996). But, in econometric applications the probit and logit models have been used at most exclusively. There are practical reasons for favoring one over the other. In some cases for mathematical convenience, but it is difficult to justify on theoretical grounds the choice of one distribution or the other. Amemiya (1981) discusses a number of related issues, but as a general proposition, the question is unresolved. (Greene, 1997).

In this study , probit model was used to explain the potential visitors' decisions on whether or not willing to contribute or pay tax for establishment of Tis Abay Water Falls Park. The dependent variable (WTP tax) is dichotomous response variable where the respondent is faced with question of whether he or she is willing to pay taxes. There are some potential visitors with a positive WTP tax and some with a zero WTP tax. We created a binary variable which is equal to one if WTP tax > 0 and equal to zero of WTPtax = 0. The qualitative model to be regressed will be:

$$P(WTP_i) = 1 \quad P_i = \gamma_0 + \gamma_1 Ag + \gamma_2 Agsq + \gamma_4 Ed_2 + \gamma_5 Ed_3 + \gamma_6 Ed_4 + \gamma_7 HI + \gamma_8 Fs + \gamma_9 Att + \gamma_{10} Bis + \gamma_{11} taste + \gamma_{12} Ass + e_t.$$

Where WTP_i = 1 if the respondent is willing to pay

= 0 if the respondent is not willing to pay

And e_t. is the error term assumed to be normally distributed with mean zero and covariance σ^2..

The independent variables used in this model include Age, Education, Household income, Family size, Attitude, Benefit and issues of concern, Availability of substitute sites and Taste.

A likelihood ratio test against for hypothesis of homeskedasticity were carried out to approach the heteroscedasticity problem in probit model. The estimate of heteroscedasticity is found by using the following general formula:

LR = -2/LogLu - LogLr/

Where Log Lu = the value of unrestricted likelihood function

Log Lr = the value of restricted log likelihood function

LR = likelihood ratio

This is asymptotically distributed as chi-squared with n degrees of freedom.

A test of the hypothesis that the null hypothesis is equal to zero can be based on the likelihood ratio statistic. The observed value exceeds the critical value, so the hypothesis of homoscedasticity can be rejected.

Table 4.10 **The WTP tax marginal effect estimates of the Probit Model ***

Variable	Coefficient	Standard Error	b/St.Er.
Index function for probability			
Constant	.8173082611	.48590766	1.682
AGE	.5872162487E-02	.27033518E-01	-.217
AGSQ	.1206013591E-03	.36402064E-03	.331
ED2	-.7253056264E-01	.85047201E-01	-.853
ED3	.4506905855E-01	.82161439E-01	.549
ED4	.2305942972E-01	.94429642E-01	.244
HI$^{\Psi}$	.1359318630E-03	.34560542E-04	3.933
FS$^{\Psi}$	-.3504930144E-01	.10996183E-01	-3.187
ATT$^{\varphi}$	.1084615161	.62543531E-01	1.734
BENIS	.2645348023E-01	.58524901E-01	.452
TAST	.1038393446	.57625771E-01	1.802
ASS	-.4551960824E-01	.57116342E-01	-.797
Variance function			
HI	.1088176000E-01	.28295530E-01	.385
FS	2.705232487	6.9066026	.392

Log likelihood function -33.04360 Restricted log likelihood -63.41946

Chi-squared 60.75171

φ Significant at 10%, Ψ Significant at 1%

* The results are heteroscedasticity adjusted

Log - likelihood ratio statistics is used to test joint significance of explanatory variables Accordingly, the chai-square statistics for the model is 60.8 and the critical value form the chi-square table is 21.03 at 95% log likelihood ratio statistics. This indicates that the over all significance of the model.

A goodness of fit measure is a summary statistic indicating the accuracy with which a model approximates the observed data (like the R^2 measure in the familiar linear regression model). In the case in which the dependent variables are qualitative, accuracy can be judged either in terms of the fit between the calculated probabilities and observed response frequencies or interms of the model to forecast observed responses. (Maddala, 1993). Then we have the goodness of fit measure:

$$R^2 = 1 - \frac{\ln Lr}{\ln lo}$$

Where

ln Lr = the value of unrestricted log-livelihood function

ln lo = the value of restricted log-likelihood function

The goodness of the fit for this model was .3901, which shows that 39 % of variations in visitors' willingness to pay.

Most often we are interested the marginal change in the dependent variable for a change in one of the independent variables. In Limdep we obtain the marginal effects with the command margin. This is because the coefficient estimates in the probit model is not the marginal effect. We estimated the marginal effects with multiplicative heteroskedasticity. The marginal effect estimates of the probit after correcting its heteroskedasticity is presented in the table 4.10.

In this case the marginal effect shows the change in the probability of the occurrence of the event due to a unit change in the independent variables. Accordingly, the significant variables are household income, family size and attitude. Household income and attitude have positive sign where as family size has negative sign. The interpretation is that household income, family size and attitude affect the probability of having a positive WTP tax. In other words, coefficients on household income indicates that other things remain constant, as household income increases, the likelihood that the willingness to pay for the establishment of the park increases. For the case of family size, when the size of the family increases the likelihood that the household willing to pay for the park decreases. The result of binomial probit estimation indicates that age, education, taste, benefit and issues and availability of substitute sites have no marginal effect on the households' to pay or not.

4.2.2.3 The Tobit Model

Thirdly, Tobit analysis of estimates will be used to investigate the determinants of WTPtax bid. Alternative method to OLS when the dependent variables is zero for the a significant fraction of the observation is the so called Tobit Model. The Tobit Model is defined as follows: (Maddala, 1997)

$$y_i = \beta^1 X_i + u_i \text{ if RHS} > 0$$

$$y_i = 0 \text{ otherwise}$$

(is a K x 1 vector of unknown parameters; X_i is a K x 1 vector of known constants, ui are residuals that are independently and normally distributed with mean zero and a common variance σ^2. It was defined that limited dependent variables are variables for which observation's are limited to a certain range. Tobit model considers the regression in which

the dependent variable is observed in only some of the ranges. These variables are censored or truncated variables. When we observe the independent variables for some observations then we have the problem of censoring. Truncation occurs when some observations are excluded based on some characteristics of the dependent variables. Accordingly, the problem of censoring is of course more important if there is a substantial number of zeroes in the sample. (Maddala, 1997).

The Tobit function is defined as follows:

$$WTP_i = \alpha_0 + \alpha_1 \ Ag + \alpha_2 \ Agsq + \alpha_4 \ Ed_2 + \alpha_5 Ed_3 + \alpha_6 \ Ed_4 + \alpha_7 Ed_5 + \alpha_8 HI + \alpha_9 Fs + \alpha_{10} \ Att + \alpha_{11} \ taste + \alpha_{11} \ BIS + u_t$$

If RHS >0

WTP_i = 0 otherwise

In this study, Tobit estimation was done for WTPtax, because 14% of respondents are not willing to pay "voluntary" tax or contributions. And it was argued that when dependent variable is zero for significant fraction of observation, the OLS estimates yields biased and inconsistent results, but the method of maximum likelihood can be used to estimate the parameters of such models. The method of maximum likelihood estimates the unknown parameters in such a manner that the probability of observing the given y's is as high (or maximum) as possible.

As we are interested in the marginal effect for the variable in our modes, we used Tobit marginal effect estimation. There is also estimation of a Tobit model with multiplicative heteroskedasticity. The Tobit estimates and the heteroscedastic Tobit marginal effect estimates of WTPtax was presented in the following table.

Table 4.11 **Tobit marginal effect estimates of WTPtax***

Variable	Coefficient	Standard Error	b/St.Er.
Constant	-22.98145252	48.709469	-.472
AGE	-22.98145252	48.709469	-.472
AGSQ	-.7453928384E-02	.38833255E-01	-.192
ED2	-3.304729547	8.9191104	-.371
ED3	-3.304729547	8.9191104	-.371
ED4$^{\Psi}$	10.47706005	2.9554879	3.546
HI$^{\Psi}$	.3954461759E-01	.80002321E-02	4.943
FS	-.527402695	1.6832630	-.314
ATT$^{\Psi}$	39.66860644	15.402373	2.575
BNIS	-3.612712469	8.0347507	-.450
TAST	11.34688224	8.1186725	1.398

Ψ Significant at 1%

* The results are heteroscedasticity adjusted

One issue that commonly arise in cross section data is heteroskedasticity. In general linear model, OLS estimates are consistent but not efficient when the disturbances are heteroscedastic. According to Maddala and Nelson (1975), if we ignore heteroscedasticity, the resulting estimates are not even consistent. Therefore, using the log likelihood ration a

test for heteroscedasticity was done. The log-likelihood ration was estimated using the following formula:-

LLR = 2 /log Lu - log Lr/

Where LLR = log-likelihood ratio test

log Lu = the value of unrestricted log likelihood function

log Lr = the value of restricted log-likelihood function

The test statistic is chi-square distributed with m degrees of freedom, where m is the number of variables. The result shows that the value of the statistic is greater than the critical value of the chi-square distribution . Accordingly, the hypothesis is reject, which implies heteroskedasticity is a problem in the model.

The Tobit model marginal effect estimates after correcting heteroscedasticity problem was presented in table 4.11. Accordingly, household income, higher education level, taste and attitude have significant marginal effect on the amount of WTPtax per family per annum have expected sign. Other variables such as age, family size and benefit and issues have no statistically significant effect on the amount of WTP tax per family per annum.

When we are comparing the regression results of probit and tobit it was found that household income and attitude affect both the probability and the amount of WTPtax. Family size affects the probability of WTP not the amount. On the other hand, education level and taste have effects on the amount of but not on the probability of WTP.

5. Travel Cost Method results and discussion

5.1 Valuation and Estimation of the Economic Benefits

The second valuation technique used in this study is the Travel Cost Method (TCM). Travel cost method adopts revealed preference approaches, and only capture use values and thereby omit any non-use value elements of the environmental goods considered. Therefore, the TCM only measures recreation benefits of the site, or natural resources being valued and option values, related to future uses, or existence values are not included. It was noted that this technique may under estimate the total economic value of such goods, but use-value often be the prime importance to decision makers and this valuation techniques has been used extensively in developed countries to value recreational goods and services.

The travel cost methods depends on information about the amount of money and time people spend getting to a site to infer a value for that site. The basic assumption of this method is that the cost in money and time spent traveling a free, or normally priced, recreational site is a reflection of people's willingness to "pay" for that site (Dixon and Hufschimids, 1986). Since survey technique can be a source of information to estimate TCM, a questionnaire was prepared and administered to 150 samples at a site in order to ascertain their place of origin, necessary demographic and attitudinal information, frequency of visit to this and other sites; and trip information such as purposefulness, length, and associated costs.

As was discussed earlier, there are two basic variant of travel cost model i.e. individual and zonal TCM. And this study applies zonal travel cost method (ZTCM). The first step involved with the TCM is the creation of a trip generating function and type of function determines the dependent variable. Therefore, ZTCM portions the entire area from which visitors originate in to a set of visitor zones and defines the dependent variable as the visitor rate.

Given available information from survey results; identification of visitors zones, estimation of average cost and visitation rate to the site from each zone derivation of an aggregate demand curve for the site; and calculation of benefits and consumer surplus from the site have been done consecutively.

5.1.1 Identification of travel cost zones

Once the trip generating function was identified, first step in zonal travel cost method study is to identify the site to be valued and divide the area or residents around it in to zones. In each zone the individuals are assumed to have equal travel costs and from the site and it is assumed that individuals with in one zone have similar preferences and attitudes. Although questionnaires were filled out for a random sample of 140 visitors, 3 had to be discarded due to incompleteness. The remaining 137 visitors were then divided by residence in to 19 groups on the basis of distant from the site and cost of travel from the site

5.1.2 Estimates of travel cost and visitation rate for each zone

In this study, visitors to Tis Abay Water Falls are sampled to determine zone of origin, socio-economic and demographic and attitudinal information; the number of site visits they make to the site per year, and the travel costs. Using information on the percentage of sampled visitors from each of the zones, total visitors per year (1998/99), and the population in each zone, the visit rate per 1000 population in each zone was determined using the following formula:-

$$\text{Visit/1000/year} = \frac{(Vi/n)\ N \times 1000}{P}$$

Where Vi = Sampled visitors from zone i

n = Sample Size

N = Visitors per year

P = Total population in zone i

After determining visit rate, the next step would be estimation of average travel cost and other relevant variables. In this study travel cost includes the money and the opportunity cost of time spent traveling to and from the site. Therefore, average monetary travel cost per round trip, the value of average time of traveling per round trip and average total cost for each zone were computed. Information on visitation rate/1000 population and average total cost for each zones are presented in Table 5.1.

Table 5.1 Visitation rate per 1000 population and average total cost for all zones

Zone	Population 000'	Visitation rate 000'	Average Total Cost /Birr/
1	182.3	105.4	70
2	375.5	42.2	350
3	2424.0	12.0	1400
4	469.4	12.1	2700
5	2450.0	4.7	4940
6	82100	1.38	10100
7	8100	12.56	6200
8	10200	3.33	7700
9	59100	1.34	9000
10	58800	0.77	11000
11	15700	3.66	8000
12	270000	0.7	12870
13	4400	7.7	5500
14	8500	2.66	10800
15	7100	1.59	11200
16	5600	2.02	7000
17	39300	1.15	11500
18	57600	0.39	11000
19	24800	0.46	13000
Total	**657201.2**	**216.11**	**145330**

Source: (1) World Development report 1999/2000

(2) Central Statistics Authority 1998

(3) Computed from sample results

Simple travel cost models include only travel cost as explanatory variable. This study has applied TC model which is different from the simple one. Therefore, the model has took in to account a number of variables in addition of travel cost, including income, taste, availability of substitute sites, quality and population. The regression equation was defined

V^{o}_{i} = f(C_i, T_i, A_i, Att, Ass_i, Q_i, $Popu_i$, Y_i)

Where V^{o}_{i} = visitation rate/1000 population at zero admission fee

C_i = round trip travel cost between zone i and the park

T_i = total time for the round trip

A_i = taste

Att = Attitude

Q = Quality

S_i = substitute sites available to people in zone i

Y_i = average income per person in zone I

Pop = Population in zone i

$_i$ = zones around the park

Using semi-log independent functional form the following result was obtained.

V^{o}_{i} =3650.6 - 1077.9 LTC + 185.2 LY - 7.196 Popu - 19.3 LT

+49..6A + 17.2 Att + 15Q - 49.6Ass

$R^2 = 0.845$ $R^2 = 0.722$

After dropping insignificant terms, the following travel cost model was estimated.

V^{o}_{i} = 2381.4 - 602.2 LTC - 1.02 LT +7.97 Att- 4.7 Ass

$R^2 = 0.71$ $R^{-2} = 0.69$,

Table 5.2 visits at various admission fees in one year

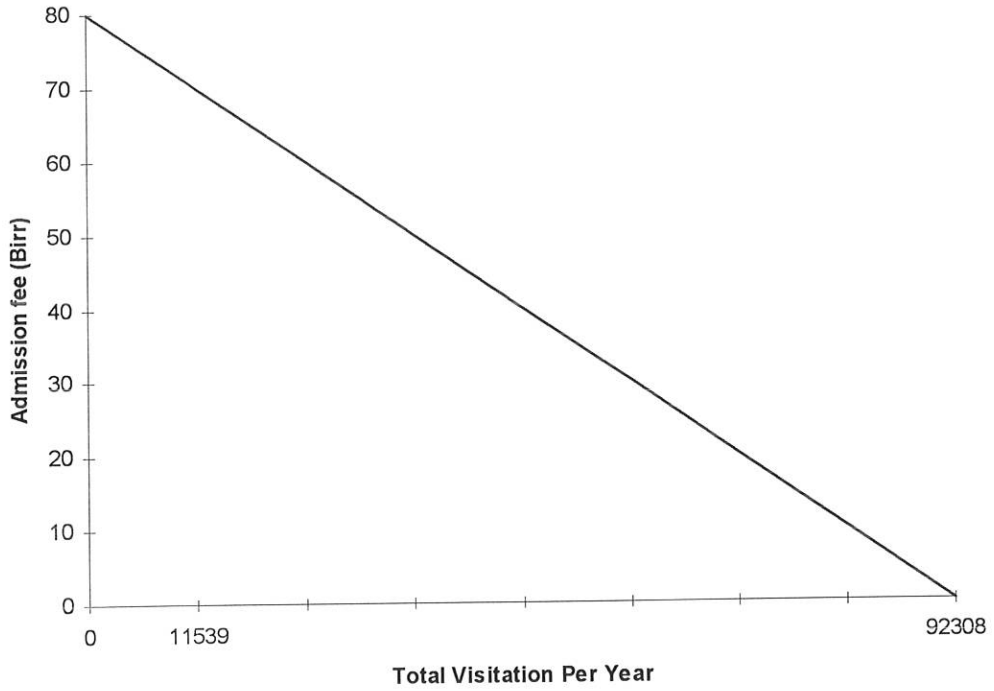
Zone	Total Cost (Birr/Visit)	Number of Visitors '00 at Various Admission Fee (Birr)								
		0	10	20	30	40	50	60	70	80
1	70	2149	1050	718	621	525	437	348	149	-
2	350	4243	1979	1300	1120	940	579	217	94	-
3	2400	2548	1011	645	516	387	170	-	-	-
4	2700	4608	2009	1159	905	651	282	-	-	-
5	4940	3812	2542	1271	845	419	-	-	-	-
6	10100	2956	1980	990	446	-	-	-	-	-
7	6200	7817	5159	3095	2476	1857	799	-	-	-
8	7700	3703	2222	1333	600	-	-	-	-	-
9	9000	570	-	-	-	-	-	-	-	-
10	11000	567	-	-	-	-	-	-	-	-
11	8800	440	-	-	-	-	-	-	-	-
12	12870	17820	11939	8119	6800	5602	4715	3809	1638	-
13	5500	10872	7284	4807	3700	2591	1214	-	-	-
14	10800	299	-	-	-	-	-	-	-	-
15	11200	42	-	-	-	-	-	-	-	-
16	7000	27950	18727	12547	10477	8406	6993	5464	2404	-
17	11500	530	-	-	-	-	-	-	-	-
18	11000	1382	898	539	243	-	-	-	-	-
19	13000	-	-	-	-	-	-	-	-	-
Total visit per year		**92308**	**56901**	**36523**	**25049**	**21378**	**15144**	**9833**	**4285**	-

5.1.3. Derivation of Aggregate Demand for the Site

It was noted that the demand functions estimated using travel cost method (TCM) is uncompensated ordinary demand curve incorporating income effects and the welfare measure obtained from this will be that of Marshallian Consumer Surplus. The observed total visitation under existing travel cost conditions represents one point on the aggregate demand curve for the site. By assuming that an admission fee has the same effect on visitation as an increase in travel cost, other points on the demand curve can be identified.

In this study, by summing up total visits across all zones at a given admission fee, a point on demand curve for Tis Abay National Park is estimated. The new visitation rate for each zone was calculated by substituting the new travel cost variable in the equation for visits to the park and solving for the visitation rate. This procedure was repeated for successive increase in admission fee. An aggregate demand curve is derived by plotting the number of total visitors per year for all zones against the admission fees.

Figure 2 Users Demand Curve for Tis Abay Water Falls Park



5.1.4. Estimation of benefits

Based on the above aggregate demand curve we can estimate the total willingness to pay for the site, and expected revenues at different levels of admission fees. The computation of the area under this curve represents the user values of the park on the travel cost approach. To estimate the value of consumer surplus, the area under the demand curve is first divided on the basis of the admission fees. Then each area under the demand curve is computed. Accordingly, the total willingness to pay for the site can be considered an estimate of the recreation benefits for establishment of the park. Therefore, the total willingness to pay which is the area under the curve is estimated to 229,109,800 Birr per year. Capitalized at 10.5 percent, this benefit yield a present value of birr 2,181,998,095 . This benefit is entirely consumer's surplus, and some part of it could be captured in order to pay maintaining the park.

The second type of benefit was estimation of expected revenues at different levels of admission fees. The estimation of consumer's surplus helps to predict expected revenues at different level of entrance fees, and this is considered as the second practical use of the travel cost survey results. It was noted that this is very important in helping park officials decide at what level to set park fees and how well they can cover their costs. Expected revenues for different entrance fees was calculated from information in table 5.2, and presented at table 5.3

Table 5.3 Expected revenue at different admission fees

/Birr'00/

Entrance fee /Birr/	Expected Visit '00 Per Year	Expected Revenue
10	56901	569010
20	36523	731460
30	25044	751470
40	21376	858120
50	15144	757200
60	9833	589980
70	4285	299980
60	0	0

As indicated above at a gate fee to Birr 10 per visit, 5690100 visits will be made in the park, and annual revenue will be Birr 56,901,000. Accordingly, the optimal entrance fee will be Birr 40, and this yields Birr 85,512,000 revenue per year

.5.2 Model specification and Regression Results

5.2.1 Model specification and hypotheses

The second method used to measure the recreational value of the Tis Issat Fall is travel cost method (TCM). This approach is more complicated than contingent valuation method. There is two type of TCM i.e. individual and zonal travel cost method. The basic model used under TCM depicts the rate of visitors per 1000 population as a function of factors such as the travel cost, the time spent traveling, substitute site and average income. This relationship can be summarized using the trip generating function as follow:- (Dixon and Hutschmidt 1986)

$$V^{o}_{i} = f(C_i, T_i, A_i, Att, S_i, Q, Pop, Y_i\ U_{i,})$$

Where V^{o}_{i} = visitation rate/1000 population at zero admission fee

C_i = round trip travel cost between zone i and the park

T_i = total time for the round trip

A_i = 1 If the respondent attach value to total economic use of the Tis Abay water falls

= 0 Otherwise

Att = 1 If the respondent consider the establishment of the park important to Region's economy

= 0 Otherwise

Q = 1 If the respondent rated the quality of the site moderate and above

= 0 Otherwise

S_i = substitute sites available to people in zone i

Y_i = average income per person in zone I

Pop_i = Population in zone i

$_i$ = zones around the park

When admission fees become positive, the model can be modified to include admission fees as one of the determinants of the visitation. The above equation thus becomes:

$$V^x_i = f(C_i + X, T_i, A_i, Att, Q, Pop, S_i, Y)$$

where X= admission fees

HYPOTHESES

The most basic models of the TCM include only a few explanatory variables- mostly in keeping with the original conception of the model ,travel cost . But , letter on an attempt has been done to capture every factor affecting demand in a trip generating function. It was argued that an elegant trip generating function retains a careful balance between thoroughness, statistical integrity and realism in the face of data requirements. That is to say, some independent variables would not be completely straight forward to include and even to explain their significance to the model.

Based on the above statement,variables such as round trip travel cost, time and availability of substitute sites are negatively correlated with visitation rate. Where as average income, population, taste, quality and attitude variables are positively related to dependent variable.

5.2.2 Estimation and Analysis

As it was mentioned earlier, the trip generating function is statistically determined through multiple linear regression. Visitation rate was analyzed using a regression model against a number of explanatory variables. The independent variables include, travel costs, income, population and other visitors related behaviors which are thought to affect the observed visitation rate. There are many ways that depict mathematically the relationship between variables. The question arises as to which models could give remarkably robust and consistent multivariate results.

It was argued that there are a number of major statistical estimation problems related with the travel cost approach. Firstly, misspecification of the functional form can lead to biased parameter estimates. Secondly, the number of visits to a site can only be a non-negative variable such that continuous estimation techniques such as OLS are inappropriate. Discrete choice models of behavior such as the multinomial logit model should therefore be used. This looks at the probability that a particular site will be visited, depending on the attributes of that site and other sites, and on the households' characteristics.

Thirdly, in any data set we will have information on people who actually have visited the site, but not on non-participants. Non-users need to be included to see what determines participation. This problem is known as Truncation Bias and has been found to have a significant impact on parameter estimates such that the estimated demand curve is flatter than the true one.(UNEP,1998)

An attempt was made to identify functional forms which best predicts the typical demand function. It was argued that the choice of functional form is important, as

changing the functional form can produce larger changes in consumers' surplus estimates from a given data set. (Hanley and Spash, 1995). Based on R^2 and precision in predicting the observed visitors semi-log (independent) was selected among the most popular forms. OLS estimation were used for semi-log functional form of trip generating function and it was estimated by the formula:-

$$V_{i0} = \alpha_0 + \alpha_1 LC_i + \alpha_2 LT_i + \alpha_3 LY_i + \alpha_4 Att_i + \alpha_5 S_i + \alpha_6 A_i + \alpha_7 Q_i + \alpha_8 LPop_i + V_t$$

The estimates of a linear recreation demand of the Tis Abay Water Falls Park is shown in the Table 5.4.

Table 5.4 Estimates of trip generating functions*

Variable	Coefficient	Standard Error	t-ratio
Constant	3650.600014	853.46379	4.277
LTC $^{\Psi}$	-1077.905770	303.55043	-3.551
LY	185.2246965	113.81704	1.627
LPOPU	-7.196497298	40.857704	-.176
LT$^{\varphi}$	-19.25039441	8.6463050	-2.226
ATT$^{\varphi}$	27.95848415	15.424176	1.813
Q	15.00707572	43.256289	.347
A	49.64205431	52.717293	.942
ASS $^{\phi}$	-42.51855919	13.551794	-3.167

R-squared= .845707, Adjusted R-squared = .72227

F[8, 10] = 6.85, Prob value = .00325

Log-L = -113.8072, Restricted(b=0) Log-L = -131.5618

LogAmemiyaPrCrt.= 10.171, Akaike Info. Crt.= 12.927

Autocorrel: Durbin-Watson Statistic = 1.82446, Rho = .08777

Results Corrected for heteroskedasticity

Breusch - Pagan chi-squared = 21.2246, with 8 degrees of freedom

φ Significant at 10%, ϕ Significant at 5%, Ψ Significant at 1%

* The results are heteroscedasticity adjusted

Trip generating function was estimated based on cross-section data set obtained from survey. It is most probable that the model may have non-constant variance (heteroskedasticity) problem. Breasch-pegan chi-squared test were used to defect the heteroskedasticity. The limdep reported the Breasch - pegan test of heteroskedasticiy and the value of statistic is 21.22, and the critical value of the X^2 distribution with 8 degree freedom at the 5% level is 15.1. This test shows that there is a problem of heteroskedasticity in the model. So, using Limdep 7.0 results as corrected for heteroskedasticity was obtained.

The adjusted R^2 is 0.67 indicating that the model explains around 67 percent variation in visitation rate to Tis Abay Water Falls recreation area. The over all significance F-test at 95 percent level of confidence shows that independent variables included in the model jointly explain the dependent variable significantly.

As table 5.4 indicates among the explanatory variables travel cost, travel time, attitude and availability of substitute sites are significantly affects the model and all of them have expected sign. The travel cost (TC) is statistically significant and negatively correlated to visitation rate as the theory predicts and round trip time (T), significantly and negatively related to the dependent variable which implies that as time span visiting the area increases opportunity cost of visiting the site also rises. Variables like attitude and availability of substitute sites are significantly and positively related to the visitation rate.

Population, income, taste and quality are found to be statistically insignificant Among these variables income, taste and quality of the site, have sign as expected but population did not confirm with our hypothesised relationship .

6.0 Comparison of the Contingent Valuation and Travel Cost Methods

This study has attempted to evaluate main results that were obtained from contingent valuation and travel cost methods. This would help to demonstrate whether CV estimates agree closely with TC or not. The comparison gives indication of how much faith can be placed in the value estimates generated by the two methods.

As was mentioned earlier, one objective of this study was to conduct a convergent validity experiment. Comparison between CVM and TCM constitutes the largest part on convergent validity. Many authors have used both methods to value recreational/wilderness resources (Hanley and Spash, 1995). Before discussing results of the two methods, it is necessary to mention some methodological and theoretical issues. It was argued that, the travel cost methods are obviously sensitive to such matters as the weighting given to multiple - destination visits and to the transformation used to derive costs from mileage values and both methods are sensitive to the usual problems of choosing an appropriately fitting equation for the derivation of the demand schedule (Knetsch and Davis, 1994).

One important point of argument is that, the welfare estimates which are based on the two valuation methods might produce remarkably different results. The contingent valuation estimate may be higher because it includes some non-use values, where as the travel cost estimate contains only direct values. That is, TCM cannot estimate non-user values. Another point is that only CVM is aninclusive method. Like other

methods, TCM is restricted to measuring a limited class of environmental goods and services. It was argue that, the application of TCM is most suitable for out door recreational resources such as forests, lakes and wet lands, but even then only the direct use values of actual users are considered.

So far we have considered only theoretical and methodological issues that could remarkable differences to the estimates of the two methods. There are, however, complementaries in the CVM and TCM techniques which may prove highly useful. In the first place, the two methods may serve as checks on each other in applied situations. One is certainly in a better position from having two methods produce nearly identical answers than if he has to depend on only one (Knetsch and Davis, 1994). The estimates of value obtained from different methods will be some what uncertain. If the analyst has multiple estimates, then they will have greater confidence in the magnitude of the values when the implementation of a valuation technique requires that primary data be collected with a survey, it is often possible to design the survey to obtain the data necessary to undertake more than one valuation method. There are, also interesting possibilities that interviews may be the best way of resolving the ambiguities in the travel - cost method concerning the treatment of multiple-destination cases and for finding the appropriate valuation for converting distance in to value.

This paper has adopted the contingent valuation method and the travel cost models to estimate economic benefits from establishment of the park. So far we have considered these two approaches briefly. At this stage it is appropriate to discuss the results of this study.

Table 6.1. Summary of Economic Value of the Establishment of Tis Abay National Park

Method Used	Gross Consumer's Surplus (Economic Value of the Park) Birr	Maximum Expected Revenue (Birr)/year	Optimum Price (Birr) per visit
CVM(wtp fee)	3,030,351,686	149,700,000	50
TCM	2,181,998,095	85,812,000	40

The above table provides a summary of the economic value of Tis Abay Water Falls in terms of Contingent Valuation and Travel Cost Methods. The comparison would be made between results of CVM under fee payment vehicles with TCM. The analysis reveals that, for the visitor benefits, travel cost and contingent valuation produced some what different estimates. The CVM estimates gives a gross consumers' surplus of Birr 318,186, 425 per annum where as TCM estimates Birr 229,109,800 per year. Accordingly, user benefits or value of park these two measures yield a present value of 3,030,351,686 Birr and 2,181,998,095 Birr respectively. In both cases the results of CVM were significantly greater than the TCM estimates.

An other comparable results are expected revenue and optimal price level. The CVM produced results of Birr 149,700,000 per year maximum expected revenue at price of Birr 50. The maximum expected revenue is estimated to be Birr 85,812,000 per annum and the optimal price is Birr 40 for the case of TCM .The analysis signifies that the maximum expected revenue and optimal price level is much higher in CVM than TCM. This demonstrates that the choice of techniques have greater effect on the results obtained and illustrates a number of difficulties could arise in deciding the level of park fees.

7. Summary, Conclusions and Policy Implications

7.1 Summary and Conclusions

There have been numerous efforts to apply a variety of techniques for valuing non-market goods. These techniques are Contingent Valuation Method (CVM), the Travel Cost Method (TCM), Hedonic price and wage technique, Avertive behavior and Conventional market approaches. Among them, this study has attempted to demonstrate the application of contingent valuation and travel cost methods to estimate the economic value for the creation of Tis Abay Water Falls park. This paper reavels that CVM and TCM application using traditional survey methodologies for recreational environmental resources. The study provides additional evidence that successfully conducted CVM and TCM surveys would give useful information on users demand for public services such as recreation.

Regarding contingent valuation method, descriptive analysis is used to summarize the over all findings of the CV survey. Under entrance fee payment vehicle the total economic benefit (Gross-Consumers' Surplus) is Birr 3,030,351,425 per annum and maximum expected revenue is estimated to be Birr 149,700,000 per year. The total economic benefit of the Tis Abay Water Falls was estimated to be Birr 35,797,010 under tax scenario per year while the park also yields an expected revenue of Birr 16,281,270 per annum. The estimated park value and expected revenue were greater under entrance fee payment scenario.

The contingent valuation responses were also analyzed with multiple linear regression, probit and tobit models. In doing so, the study looked into factors affecting users and potential users willingness to pay for establishment of Tis Abay

Water falls park. The multiple linear regression estimates were used to evaluate the socio-economic and demographic characteristics, attitude, taste and issues of concern of visitors on the willingness to pay for the park services under park fee payment vehicle. The results indicate that income, education, taste and attitude have statistically significant positive influences on the amount of willingness to pay. Other variables such as availability of substitute sites, family size and age are negatively related to the dependant variable ,WTPfee.

Concerning the second payment vehicle probit model was used to analyze the potential visitors' willingness to pay voluntarily contributions or taxes per family per annum. The estimated bid model revealed that only income and attitude are variables significantly related to the probability of having positive WTP and family size significantly and negatively affects probability of WTP. Tobit model has also been used to estimate the effect of the variables on the level of WTP under voluntarily tax scenario. Accordingly, heteroskedasticity adjusted result indicates that variables such as income, education level, taste and attitude statistically do have effect on the level of WTP under tax payment vehicle.

Generally, the results from the paper suggest that estimates of WTP under fee payment vehicle are likely to reflect true preference. This may be explained by the following reasons. First, the result of multivariate analyses exhibits that most of the explanatory variables are statistically related to the WTP of visitors. Second, the observed sign of coefficients in general is congruent with prior notions about the explanatory variables. The findings from this study suggest that visitors demand can be effectively predicted using multiple linear regression and identified explanatory variables.

On the other hand, the potential visitors willingness to pay "Voluntary" taxes is not remarkably predicted by the probit model. The estimated coefficients except household income, family size and attitude others were not statistically related to the responses of the potential visitors willingness to pay. Such findings provide information that potential visitors considered their personal circumstances and budget constraints when answering the willingness - to- pay questions.

Contingent Valuation Method (CVM) is also used to estimate opportunity costs to local users of the area following park establishment. It was found that the establishment of the Tis Abay Falls National Park will not pose significant economic cost on the local population as the result of inaccessibility to the park and the resources it contains. This is because, there are only few villagers who have traditionally depended on the proposed park area and most of them are settled out side the park area. This implies the villagers may have positive attitude towads the creation of the park. In addition to this, the proposed park area is only $9km^2$ which actually does not affect large population. In short, it can be said that the establishment of Tis Abay Water falls park has insignificant economic loss to the local villagers.

The study also employed travel cost method in order to estimate the value of Tis Abay water falls recreation . It is argued that travel cost model is established as a technique for valuing the non-market benefits of outdoor recreation resources. The outdoor recreation resources to which TCM can be applied are an important subset of environmental assets. In this paper, an attempt was made to quantify recreation value of Tis Abay Water Falls applying a zonal travel cost method. This demonstrates the economic value visitors assign to their visit over and above the price they have already paid to access the resource.

Multiple linear regression was used to estimate the users demand function of the Tis Abay Water Falls Park. The result of the estimated demand function indicates that travel cost, round travel time, attitude and availability of substitute sites have statistically significant influences on the visitation rate. The estimates of coefficients were consistent with prior expectation. Variables like total cost visitors' total time for the round trip and availability of substitute sites are negatively while attitude positively related to visitation. Income has expected sign though statistically insignificant while population is statistically insignificant and has not shown the expected sign.

Using the identified demand function total visitation rate at different entrance fee was estimated. The effect of the admission fee is to increase the travel cost from each zone to the park, leading to a decrease in the visitation from each zone. The new visitation rate for each zone was calculated by repeating for successive increases in admission fee. An aggregate demand curve has been derived by plotting entrance fees against total visitation. Consumer surplus, a measure of the consumers welfare, has been estimated from the area under the demand curve. Accordingly, the total WTP for the park has become Birr 2,181,998,095 per annum. This estimation of consumers' surplus is in turn used to predict revenues at different levels of gate fees. The result indicates that at a gate fee of Birr 40 per visit, 2,137,800 visits would be made to the park and annual revenue would be Birr 85,812,000 per year. This represents the optimal gate fee and maximum revenue respectively.

This study has tried to test whether there is convergence or not between the estimates of CVM and TCM . CVM has given much higher economic value estimates than TCM. Accordingly, total economic value is estimated to be Birr 3,030,351,686 and Birr 2,181,998,095 per annum under CVM and TCM methods respectively. This is because the CVM includes non-use values which is not captured by the TCM. It was argued that CVM studies are heavily dependent on how well the study is designed, carried out and interpreted. Given that these tasks are performed well, then CVM is a useful technique for estimating economic values for some non-market resources. In this regard, the CVM technique has produced estimates of economic value of Tis Abay Water Falls which might place faith on the estimates.

On the other hand, significant problems associated with TCM might oblige us to doubt estimate of consumer surplus measures. It faces reasonably formidable questions, such as the correct approach dealing with time, the treatment of different types of travellers, and the correct specification of the trip generating function. The reliability of TCM estimates should be seen under the complexities alluded to above. The primary basis of critism seems to be that the method has a tendency to produce "incorrect signs" that is, negative values for characteristics which would have been thought desirable (for example, income coefficient). Despite, these criticisms, however there is great work attempting to make progress on these and other related issues. Generally, TCM is one of the most tools we have for the estimation of user value for non-market assets.

7.2 Policy Implications

One obvious importance of the non-market valuation of environmental resource is that it facilitates a more complete cost-benefit analysis. It was argued that government policies can affect environmental resources. This is because environmental costs and benefits have not been well integrated in government policies. In response to the growing concern about environmental changes and the threat it poses to human well being and economic and social development, governments have started incorporating the impacts into their development decision making.

Government development policies include, investment decisions, resource mobilization, project design and implementation and allocation of development benefits. Along with formulation and implementation these policies, it is argued that, proper considerations of environmental effects will improve the quality of the effectiveness development efforts. Thus, study has attempted to explore policy implications in terms of conflicting demands on resources among projects, environmentally sensitive areas and resources and allocation of benefits.

A) Evaluation of environmental resources with different non-market techniques:- This study has addressed the benefit of the establishment of the Tis Abay Water Falls National Park using contingent valuation and travel cost methods. Both techniques have produced remarkable and significant economic benefits, indicating that the inferred recreation valuation of the Tis Abay Water Falls can potentially exceed the competing alternatives. It is a signal of a current bias limitation of economic

appraisal of Tis Abay II hydro-electric power project which largely ignores irreversible effects of the project.

B) Multifarious Development policy:- The existence of substantial consumers' surplus illustrates that establishment of the park would produce benefits that highlights reconsideration of Tourism Commission 's proposals. As discussed, there is trade-off between the creation of Tis Abay Water Falls and Tis Abay II hydro-electric power project. This can be resolved with development policy which emphasis simultaneous persuasion of multifarious development objectives. This suggests the need to have environmentally sound and sustainable development plan.

C) Identification of environmental interacting and conflicting resource uses:- The study indicates that around Tis Abay Water Falls environment conflicting has been resulted from the use of resource and function of energy production at expense of tourism benefits. This is mainly, the outcome of incompatible valuation of Tis Abay Water Falls resource. It was argued that environmentally interacted or resources conflicting demand projects may reduce the benefits of another projects. This is mainly because of uncertainty about future benefits. This study indicates that conflicting project proposals around Tis Abay Water Falls was "resolved" without giving due consideration of the valuation of preservation and development of the resources. So, recognition of environmental issues and the "stakeholders" and their influences is the first step of resolving conflicts.

D) Improvements in selecting and implementing projects:- The Tis Abay II project has been identified as a priority for development, due to its economic attractiveness and short anticipated period of construction. But, this study has shown that Tis Abay Water Falls resource alternative use i.e. economic value of tourism can be significant

if it is properly and thoroughly valued. The evaluation should be based on criteria for environmentally sustainable development including treatment of environmentally sensitive areas and resources, site selection criteria and specific measures to mitigate adverse impacts. This implies that formulation of environmentally sustainable development project criteria is very important.

E) Environmentally sound and carefully planned tourism development plan:- Contingent valuation method particularly under WTP fee payment vehicles has produced significant consumer surplus and expected revenue. This exhibits that Tis Abay Water Falls recreation has great potential for tourism. As it was indicated in "Tourism Master Plan" and emphasized by local government bodies. by improving existing facilities and services, the site can generate significant revenue. Especially, building facilities like camping, logging, viewing site which could increase stay of tourists at the recreation area and hence maximizing economic benefits of the resources. In addition to that, Tis Abay Water Falls completes northern tourists circuit, the improvement of site has also positive impacts to tourism development in the region.

The above analysis suggests the need to have environmentally sound and carefully formulated tourism development plan. That is, tourism development plan should be integrated to the overall development plan. If this was the case conflict interest around Tis Abay Water Falls resource would not be seen.

F). Macro economic policy analysis:- It was argued that the environmental dimension has to become a regular consideration in the design of macro-economic policy and

this constitutes a major departure from much current policy analysis. Tis Abay II hydro-project implementation was started before final agreement reached between Ministry Water Resource and Tourism Commission. But, this could have been resolved if a proper macro-economic policy analysis was done during preparation of Tis Abay II hydro-project. Sucessful environmental assessment internalizes environmental concern through measures taken at the early part of the decision making stage. This includes identification of property rights of environmental resource both sector and localities wise.

G. The use of resources and benefit allocations:- The establishment of Tis Abay Water Falls National Park benefits local population by creating jobs and stimulating local markets. This has also national benefits and usually confused by failure to separate two types of economic consequences or benefit. This includes identification of property rights of environmental resource. The failure to capture this might lead to improper recognition of relevant and legitimate economic interests, and to inferior planning and policy choices. This indicates that evaluation of alternative uses of Tis Abay should be viewed under local and national benefits. Identification of resource users is very important because the use of resources can also be influenced by other policies which are more directly focused on the resource users.

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DECLARATION

The thesis is my original work, has not been presented for a degree in any other University and that all sources of material used for the thesis have been dully acknowledged.

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