ADDIS ABABA UNIVERSITY
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"Willingness to Pay for Amenity Values of Urban Forest: The Case of Addis Ababa."

By

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Abstract

The forest resource in Addis Ababa, particularly the mountainous areas to the north and western directions of the city was once covered with dense natural forests of diverse species. But now a day only few patches of natural forests are left in this area mainly due to development activities, agricultural expansions, over exploitations associated with rapid population growth and too little natural management of forest land. These events have resulted in serious environmental degradation.

In view of these problems, a botanic garden is introduced in this area so as to give answer for the urgent need to conserve and sustain-ably utilize the remaining natural forest and restore degraded forest areas through expansion of forest plantations. Therefore, economic analysis is required for proper management of urban forests. Such analysis would help to make decisions on varieties of urban land use options and investments. Hence, this paper has examined the application of Contingent Valuation Method in measuring the households' willingness to pay (WTP) for improved amenity service of urban forests and tries to identify the factors that may affect their WTP.

The total WTP amount for improved amenity service of urban forests through executing the botanical garden is estimated to be Birr 4,265,211 per month. The mean WTP for the open-ended and dichotomous choice formats are Birr 6.07 and 9.30 per month per household respectively. In addition to this, above 87% of the respondents have the demand for further improvements. Here, the main values are related to non use values while use values are achieved distinctively low priority. Households income, above grade 6 level of education and respondents trust for the reliability of the project implementation are found to be the major determinant factors for households WTP.

This study also indicated that households' welfare gains in changing from the current situation (poor environmental condition with no payment) to the improved service by subscribing some reasonable price can be huge. It also suggests that Contingent Valuation survey can measure amenity values of urban forests with theoretically consistent and sufficiently reliable results.

CHAPTER ONE

1.1 Introduction

Ethiopia is one of the most biodiverse countries in Africa with exceptionally high levels of endemism. But this is threatened by the decline in habitat as a result of population growth, misguided government development policies, the negative development consequences arises from ecological ignorance and mismanagement of the natural resource base with all interlinked effects on wildlife and forests (Girma Defar, 1998). As a result, the natural forest cover is declining over time and now it is reported to be 2.3% of the total area (Ministry of Agriculture, 1994). This environmental degradation has endangered many species and yet indigenous trees are not adequately planted. The loss of these genetic resources can be a major loss for the development of the country. Therefore, arresting deforestation and expanding the forest resource base should be the vital elements in the development strategy of Ethiopia.

The ability of trees to reduce pollution and improve atmospheric conditions is well known and makes woods in the vicinity of towns (cities) particularly valuable. As well as the cleansing of photosynthesis, the leaves serve to filter out dust from the atmosphere and the defluxion of wind dissipates pollution. Wide belts of close-foliaged trees also reduce noise. In addition to these benefits, urban forests treat waste water, improved aesthetics and psychological well being (Canadian urban forest strategy, 2004). Among these benefits, amenity values in particular, have been emphasized as contributing to the quality of urban life (Miller Roger L. 1997). These benefits accrue not only to certain group of dwellers but also to the entire community. Hence, it is able to say that many products or services of urban forests are public goods.

It is known that urban parks, forests and open space systems provide many amenities for city dwellers, especially for those people who are not able to afford private facilities. But only few urban recreational areas are available in Addis Ababa. On the other hand, many areas of the country's national parks may be devoted solely to recreation and is therefore providing their recreational service to the urban dwellers at a far greater cost. Taking these considerations together there can be little doubt that urban forest recreation is the most economical which the country can provide. There is also a sound economic argument for urban forests. Once established, woodlands are cheaper to maintain than any other type of park or recreational land (Philip M. Coppack, 1988). We can therefore rest assured that the development of urban forests as part of our environment for living is as economically sound as it is aesthetically and scientifically desirable (The meaning of urban forest and urban forestry is attached as appendix I).

With regard to this, the city Government of Addis Ababa has planned to establish a Botanical Garden (which covers 700ha of land) in Entoto area and 13 forestry rehabilitation projects are also intended to curb the existing environmental problem. Of course, as the proposal is forwarded for planting woodlands, as a first step to the rehabilitation of these areas, fear could be expressed that the trees would be destroyed as soon as planted. However, by engaging the community in active participation in the planting process, these fears would be groundless and the community will take care of the trees instead of destroying them.

Furthermore, in Ethiopia, general policy guide lines have been developed to conserve and sustainably utilize forest resources. But unfortunately, there are relatively non analytical studies (particularly on economic valuation of urban forests) that can provide more specific policy recommendations. And yet perceptions of public value may not incorporate the scientifically confirmed public goods and services of urban forests. Thus, evaluation of the amenity service is important so as to assess the costs and benefits of different land use options. With regard to this, different studies revealed that planting trees as an alternative use of land was the best in terms of environmental benefit and financial profitability. For instance, the study by Daba (1998) revealed that the financial return from Eucalyptus globules plantation in the high lands near Addis Ababa, as compared to agricultural production, was above 8 to 30 times higher at 10% discount rate.

Therefore, this paper has attempted to estimate the amenity value of forests in Addis Ababa by focusing on the Botanic Garden around Entoto forest area. So, the green space administrators can use valuation data in strategic management efforts on behalf of urban forests.

1.2. Background and Problem Setting

The urban forest resource is recognized as an essential component of the urban infrastructure. Urban forestry is internationally regarded as a most effective way of maximizing such benefits on a sustained basis for the good of both present and future generations of urban dwellers. According to wolf, K.L (2004), scientific understanding of how urban trees and forests benefit people has expanded substantially in recent years to include social, environmental and economic domains. Despite increasing scientific evidence, there is a lag in policy response in many municipalities. Addis Ababa is regarded as one of these municipalities.

Addis Ababa, with an area of 540 square kilometer and a population of above 3 million, is a capital city of Ethiopia. Its altitude ranges from 2100m in the Akaki area to over 3100m on top of the Entoto Mountain.

This mountainous area was previously covered by indigenous forest. But now only few patches of natural forests are left in this area. Thus, in order to bring back to its previous ecological conditions, a botanical garden is introduced in this area. Total volume of trees in the garden is 36,202.18 m3 of which 26,121.49 m3 is Eucalyptus globules and 10,080.69 m3 is Juniperus Procera. Up to now 276 indigenous plant species i.e, 12 trees, 12 shrubs, 123 herbs, 10 climbers and the remaining grass and ferns have been identified with in the botanic garden and out of the total, 30 are endangered plant species.

Although urban forests provide many benefits, no payment is made by the users and hence it is difficult to express its value directly. On the other hand, even when environmental values are recognized, they may not be measured or used to promote efficient resource management (Kramer et al 1992). As a result, actual choice of land is often biased in favor of land uses that do have marketed out put. This fact is also supported by the city government of Addis Ababa that loss of biological diversity has been caused in the city by clearing trees to facilitate development projects such as commercial set ups, residential areas, industrial establishments, road networks etc. In addition to this forests in Addis Ababa are not adequately protected from illegal cutters and there is clearance of forests practically in the northern hills (Clean and Green Addis Development Plan, 2004). The result is too much conversion and over exploitation of forest and too little natural management of forest land.

It is clear that the pursuit of the amenity environment (pleasantness, aesthetic, cultural and recreational attributes) has the ability to satisfy individual wants. This is a prerequisite of any economic commodity. Thus, forests must be maintained and protected in order to have sustainable environmental services. Moreover, there is a need to increase the utility of the dwellers by improving urban forest recreational sites both in terms of quantity and quality of different tree species (particularly indigenous species).

However, there are only 11 public parks in Addis Ababa and around 32 hectares of land is taken by individuals for serving as recreational parks. According to Clean and Green Addis Development Plan (2004), these parks are limited in number compared to the demand and the size of population of the city. In ratio one public park serves for 263, 636 persons. The existing coverage of road parks is also very small. It is estimated to cover an area of 210 hectares only. Moreover, the land which is covered by indigenous tree species is estimated to be 246 hectares only and the forests have an over-representation of relatively few species. This narrow genetic base could leave the urban forests of Addis vulnerable to insects and disease infestations.

In addition to the above information, there are 3 orthodox churches and hence a number of people flock to the botanic garden especially during annual celebrations and to baptize by the holly water (known as 'Tebel').And also there are 182 registered household settlers with in this Botanical Garden. Consequently, high human interference has been observed. To conclude, the forest resource in the city is one of the most affected natural resource by human activities and there is very limited private participation in this area.

On the other hand, urban forest will be adequately planned and stewarded only if urban citizens and elected decision makers recognize and understand the full range of services that trees and green space provide. Hence, there is a need to know the relation ship between people's willingness to pay (WTP) versus the capacity to afford the cost for improved environmental service. This will enable policy makers to appropriately design forest policy and to make decision involving alternative land uses so as to ensure sustainable use of forests.

Unlike all the benefits provided by urban forests, this paper will focus on calculating the households WTP for improved amenity value of urban forests in Addis Ababa (particularly on the proposed botanic garden around Entoto area) and tries to determine the factors that may affect it.

Hence, it will help to incorporate environmental considerations in to economic decision-making.

1.3. Significance of the study

To our information, only one study has been attempted (by Anteneh Kebede, 2005) to include the amenity value of Shashemene forests in to the forest accounting of Ethiopia. He found that out of the total value of this forest, amenity value has a share of only 5 percent. But different literatures show that the contribution which wood lands could make (in terms of its benefit other than timber production) to urban environment is greater than that of the country side. Hence, it is difficult to aggregate this value at the national level. Furthermore, in most studies of forest resources conducted mainly in developing countries, amenity benefits of urban forests are not valued empirically. Therefore, this paper would hopefully add value by trying to find empirically the amenity value of urban forests particularly in Addis Ababa.

The city government of Addis Ababa has planned to establish a botanical garden in Entoto range between Kolfe keraniyo and Gullele sub cities. According to Addis Ababa City Government Environmental Protection Authority (2005), this program is going to be introduced in Ethiopia for the first time. Therefore the result obtained from this paper will be an important input in terms of investigating the residents WTP for the proposed scenario and designing appropriate policy measures for the successful implementation of the program through community participation basis. Because the development of sustainable, affordable and effective supply of the amenity service should promote the active involvement of the local communities.

In addition to the above purposes, evaluation of the amenity service of urban forest is important for assessing the costs and benefits of different land use options.

1.4. Objectives of the study

Optimization of benefits and values requires a comprehensive and systematic, or green infrastructure approach to conserving, creating and stewarding urban forests (wolf K.L, 2004). Therefore, by optimizing the benefits and values, this study has ultimately aimed at providing appropriate forest amenities in and around towns (cities) on a sustained basis for the good of both present and future generations of urban dwellers. This objective coincides with the general objective of this study.

Specific objectives of the study are:

- To estimate the value of the amenity service derived from urban forests and to measure residents willingness to pay (WTP) for the improved services (in terms of both quantity and quality of different tree species).

- To measure the amenity value of forest in Addis Ababa and get some indications for the whole urban forests in Ethiopia.

- To identify the factors that may affect amenity values of urban forests and to show their effect on households' willingness to pay.

- To provide policy – makers with useful information so as to make an informed public decision in urban development planning

CHAPTER TWO

2. Literature Review

2.1. Theoretical Literature Review

2.1.1. Economic Valuation of Environmental Benefits

Environmental values can be broken down in to two categories: use values which are placed by individuals on environmental goods and services that they actually consume and non-use (passive) values. Non-use values can be further sub-divided in to existence value and option value. Option values are placed by individuals on an amenity they may use in the future, even though they do not use it by now. An existence value is a value placed on an environmental good or service that is unrelated to consumption of that good or service. These values may include recognition of the value of the very existence of certain species or whole ecosystems.

As described above, some environmental resources are not traded through markets, and so will not have market prices. However, the absence of price for a resource or external effect does not mean that it has no value. Obviously, as far as well being is affected, there is a value that is either positive or negative depending on whether well-being is increased or decreased. Therefore, such values should have to be estimated so as to make allocatively efficient decisions. Similarly, the issue of sustainability has at its core the phenomenon of market failure and a need to have correction through proper resource pricing.

The fact that public goods and goods with externalities are not efficiently allocated by the market suggests the possibility of improvement by public action. But, whether the public action yields net benefits requires measurement of environmental benefits and costs. In connection to this, economists have developed a number of techniques for measuring the economic values of benefits associated with non-market allocation of environmental amenities and natural resources.

In estimating monetary values for environmental resources we are concerned with how changes in the provision of environmental public goods impact up on individuals' utility. Because from conventional economics it is generally accepted that measures of economic value should be based on what people want; and that individuals, not the government, should be the judges of what they want. Using this notion of value, the maximum amount of one thing a person is willing to give up to get more of something else is considered as a fair measure of the relative value of the two things to that person. The development of such methods can be traced to the subject of welfare economics and the recent development of environmental economics

2.1.2. Welfare Measures

Traditionally the welfare gain or loss from the change in the provision of environmental public goods have been approximated by changes in ordinary consumer surplus. Consumers' surplus is the area underneath the ordinary (Marshallian) demand curves and above the price level. However, it is practically difficult to estimate Marshalian demand curve for un priced environmental public goods. Because the information required in estimating it will not be directly observable.

Furthermore, according to Bateman and Turner 1992, a more fundamental theoretical problem remains in that the presence income effects mean that consumer surplus it self can give an inaccurate measure of the welfare change resulting from a change in good provision. Therefore, to avoid this ambiguity, we need to compensate for the income effect by holding real income constant. This approach commonly uses the compensated (Hicksian) demand curve and evaluates welfare change as the money income adjustment necessary to maintain a constant level of utility before and after the provision of the good. The theoretical structure for welfare estimation is thus provided by indirect utility functions and expenditure functions.

To show these relation ships, let us consider an individual (a typical household) with a maximization problem given by:

Max $U = U(X, Z)$

Subject to $\Sigma P_iX_i = M$ .... (1)

Where U is utility function of a household

Xi is vector of market goods

Z is vector of environmental (public) goods

Pi is market price of the i th good and

M is money income of the household

Solving the first order condition for the above equation yields a set of ordinary (Marshallian) demand function.

$$X_i = X_i(P_i, Z, M) \quad \ldots\ldots\ldots\ldots (2)$$

Substituting the marshaling demand function (equation 2) in to (1) gives indirect utility function defined by equation (3).

$$V(P, Z, M) = U(X_i(P, Z, M), Z) \quad \ldots\ldots\ldots\ldots (3)$$

Therefore, the change in individual's utility due to the change in environmental (public) good, Z, will be:

$\Delta U = V(P, Z^*, M) - V(P, Z^o, M)$ .... (4)

Where Z^o is the environmental good at the status quo and Z^* is the environmental good after the proposed change.

But utility functions like the one shown in equation (4) are not observable and hence it is necessary to convert it in to money measures of utility change.

There are two equally valid ways of describing money welfare measures; one is with the ideas of compensating variation (CV) and equivalent variation (EV) and the other is with the idea of willingness to pay (WTP) and willingness to accept (WTA). They measure the same phenomenon- the increment in income that makes a person indifferent to an exogenous change. The change might be price change, a quality change, or a change in some public goods. Here, we will focus on the later one.

WTP is the maximum amount of income a person will pay in exchange for an improvement in circumstances, or the maximum amount a person will pay to avoid a decline in circumstances. Where as WTA is the minimum amount of income a person will accept for a decline in circumstances, or the minimum amount a person will accept to fore go an improvement in circumstances i.e. these changes can be positive (welfare gain) or negative (a welfare loss). Based on this information, the indirect utility function can be expressed in terms of WTP and WTA as follows;

$V(P, Z^*, M\text{-}WTP) = V(P, Zo, M)$ .... (5)

When $Z^* \geq Z$ and increase in Z are desirable

Here, WTP expresses the amount of income that compensates for (or is equivalent to) the increase in the public good. We can also able to consider the change in income that makes an individual indifferent between two situations as defined below.

$V (P, Zo, M+WTA) = V (P, Z^*,M)$ ……………………..(6)

Similarly, the changes in price of marketable goods can be valued by evaluating the indirect utility function at a new price vector, P^*.

Besides, let us look for the dual aspect of the utility maximization problem in which an individual minimizes expenditure subject to constant utility.

$$\text{Min } \Sigma \, Pi \, Xi$$

$$\text{Subject to } U(X, Z) = U \text{ ……………………. (7)}$$

Solving the first order condition of equation (7), we can get the compensated (Hecksian) demand function given by equation (8) below.

$Xi = Xi (P, Z, U)$ ……………………… (8)

By substituting the compensated demand function in to equation (7), we can obtain the expenditure function denoted as:

$M (P, Z, U,) = PXi (P, Z, U)$ ……………………… (9)

Generally, for proposed change in environmental or public good (Assuming Z^* is preferred to Zo), it is possible to represent WTP and WTA explicitly by the expenditure function as follows:

$$WTP = M (P, Z^o, Uo) - M (P, Z^*, Uo)$$

$$\text{When } Uo = V (P, Zo, M)$$

$$WTA = M (P, Zo, U^*) - M(P, Z^*, U^*)$$

$$\text{When } U^* = V (P, Z^*, M)$$

By applying similar mechanisms it is simple to evaluate welfare measures in the case of change in price of marketable goods and a decline in environmental good(see Bateman and Turner,1992; Haab and McConnell,2002).

In theory the amount of income consumers are WTP to ensure the change in welfare or the amount of income they are WTA to endure the change is obtained directly by estimating the true Hecksian welfare measures of these changes. Indeed neoclassical utility theory might lead us to expect the same result. However, there are empirical divergences between these two measures. Hence, we will address this problem in the later sections so as to identify the appropriate measure of welfare.

2.1.3. Valuation Methods

There are two major types of environmental valuation techniques; monetary and physical. Physical valuation techniques measure environmental impacts them selves. For example: measuring pollutions and their effects on health, vegetation or buildings. This method is most useful when individuals are unaware of the environmental effect in question (Bjo`rn T.Olsson, 2001). And monetary valuation techniques which is the appropriate economic approach can be further divided in to indirect (revealed preference or behavioral) and direct (expressed or stated preference) methods. With behavioral methods, the researcher observes individuals behavior in response to changes in public goods, and from this behavior attempt to infer the value of changes in public goods. This method includes travel cost (TCM) and hedonic pricing methods (HPM).

In the stated preferences approach researchers pose contingent or hypothetical questions to respondents, inducing responses that trade-off improvements in public goods and services for money. From the responses one can infer preferences for or the value of changes in public goods. This method includes; contingent valuation method (CVM) Contingent ranking, Choice experiments (CE) and contingent rating .The most prevalent method is contingent valuation.

In this paper, we shall not be able to cover all the methods Instead we will give a reasonably comprehensive account of the main features of one of the most widely used technique (contingent valuation method) and also provide a brief introduction to the essential features of some other techniques.

2.1.3.1. Travel Cost Method

This method relies on the simple idea that it ought to be possible to infer the values placed by visitors on environmental amenity services from the costs (in terms of time and money) that they incurred in order to experience the services. Different individuals will face different travel costs to any site, and one individual will face different travel costs for the different sites he or she might visit. The responses of people to this variation in the implicit prices of visits are the basis for estimating the values of recreation sites and changes in site quality.

All models of the demand for recreation are essentially models of the allocation of time (Haab and Mc Connell, 2002) and as such, must meet the individual's time constraint and income constraint. But the need to account for the value of time, which also tends to be highly correlated with travel cost, is not so easy to measure. The other major problem of TCM is that it ignores non-use valves. Since it ignores the existence and optional values of environmental resources, this method would understate the amenity benefits obtained from urban forests and hence TCM is not an appropriate technique in this study.

2.1.3.2. Hedonic Pricing Method

The hedonic pricing method (HPM) attempts to impute a price for an environmental good /service by examining the effect which its presence has on relevant market priced good. It identifies environmental service flows as elements of a vector of characteristics describing a marketed good. That is, assuming that people will pay more for a house located in the vicinity of good environmental qualities the values of the surrounding environmental quality will be embedded by the prices for houses.

Hedonic prices result when quality differentiated goods are sold in competitive market (i.e it assumes that the housing market is in equilibrium). But practically the housing market would not be in equilibrium since buyers choose among a fixed set of houses rather than optimizing at the margin. And if the equilibrium conditions do not hold, then the welfare conclusions do not follow.

Generally, indirect methods such as TCM and HPM can be used when there is a link between environmental amenity and the price of a good on the market, i.e they are based on actual behavior. The major disadvantage is that they can not be used to estimate non-use values, which may be considerably high. To estimate both use and non-use values of an environmental good, we have to rely on direct methods.

2.1.3.3. Choice Experiments

It is one of the most recent developments in valuation work based on stated preferences method. In a choice experiment (CE), individuals are given a hypothetical setting and asked to choose their preferred alternative among several alternatives in a choice sets, and they are usually asked to perform a sequence of such choices. Each alternative is described by a number of attributes or characteristics. A monetary value is included as one of the attributes. Thus, this method gives the value of a certain good by separately evaluating the preference of individuals for the relevant attributes that characterize the good, and in doing so it also provides a large amount of information that can be used in determining the preferred design of the good. Therefore, choice experiments have advantages in that values for each attribute as well as marginal rates of substitution between non-monetary attributes can be obtained.

Although CEs have been used extensively in some developed countries for transportation studies (especially to explain mode choice as a function of its attributes), marketing studies, and natural resource damages assessment work, we are not aware of any applications in developing countries.

The repeated nature of the choice task makes CE difficult to behave strategically (Adamowicz et al, 1996). Because, there is no clearly identifiable agenda in a sequence of choices where almost all levels of attributes change from one choice set to another. The other possible difficulties associated with CE include respondents fatigue, frustration (if the respondent dislikes all of the possible alternatives), and the decision to ignore one of the attributes if its level lacks credibility.

Further more, the assumption that each respondent has perfect information regarding the preferences of other respondents is unrealistic.

In addition to the above, CEs may be less prone to trigger behavioral problems associated with measuring non-use values than CV Surveys (Francisco Alpizar, Fredric Carlson and Peter Martinsson, 2001). The reason for this is that in a CE individuals have to make trade offs between several attributes. Several of which may contain non-use values.

2.1.3.4. Contingent Valuation Method

The contingent valuation method (CVM) is used to estimate economic values for all kinds of ecosystem and environmental services. The method has great flexibility, allowing valuation of a wider variety of non-market goods and services than is possible with any other non- market valuation technique. It can be used to estimate both use and non-use values, and it is the most widely used method for estimating non-use values. The method involves directly asking people, in a survey, how much they would be willing to pay (WTP) for specific environmental services or how much compensation they would be willing to accept (WTA) to give up specific environmental services. It is called contingent valuation, because people are asked to state their WTP/WTA, contingent on a specific hypothetical scenario and description of the environmental service. But the question here is to determine whether WTP or WTA is the appropriate measure of welfare.

In theory, absent income effects and when WTP is a small fraction of income, WTP and WTA for a given commodity should be approximately equal. However, a number of contingent valuation studies have found that WTA is often much larger than WTP for the same commodity. Various explanations have been offered for the differences. One explanation is that the difference between WTP and WTA depends on the elasticity of substitution between the commodity to be valued (a public good) and private substitutes. According to Haneman (1991), the lower such elasticity, and the fewer the available substitutes, the greater the difference between WTP and WTA i.e for unique, irreplaceable environmental assets which individuals care a great deal about. Another explanation is that individuals value losses more heavily than gains. Such psychological effects could account for some WTP/WTA differences (Knetsch and Sinden, 1984). It is also argued that WTA questions may be less readily understandable than WTP ones, since most people have more experience of buying goods, pay in taxes etc. than of selling (Hoehn and Randall, 1987: Coarsely et al, 1986).

Many practitioners have taken the pragmatic decision to regard stated WTP valuations as reliable measures of true WTP and therefore to use CVM only in cases in which WTP is the appropriate measure of benefit. Harries and Brown (1992) have argued that WTP is in fact the appropriate measure of welfare change for a majority situations. They identify only self interested losers from a resource change as the appropriate group to be surveyed with WTA format questions. Also Carson (1991) suggests that WTP should be used whenever the individual might insure benefits from the proposed policy, and Mitchell and Carson (1989) offer ways to frame the payment question to elicit WTP.

Generally, the WTP option is recommended since it is the more conservative choice. A conservative design increases the reliability of the estimate by eliminating extreme responses (Arrow, k, Sollow et al (1993)).

CV can be carried out by use of direct questionnaires or through the use of experiments that determine how individuals respond. Face-to-face (in-person) interviews are the most reliable method but also the most costly. Mail surveys are likely to have lower response rates than telephone surveys but are not as expensive. Moreover, the literacy levels in some developing countries like Ethiopia are still too low to permit mail or self administered surveys and also telephones are not available to many of the population. If resources are available to properly train and supervise the enumerators, face-to-face interview is better than other survey methods for developing countries (where there is cheap labor). Therefore, this study uses a face-to-face interview so as to get more accurate and reliable information.

A CV study requires three basic items. First, the respondents must be given careful information about the commodity to be valued. Second, questions which elicit the respondent's WTP for the good /service if confronted with the opportunity to obtain it under the specified terms. And the third item required under this study is concerning the socio-economic and demographic characteristics of the respondents.

2.1.3.4.1 WTP Elicitation Techniques

A respondent can indicate his /her choice or preference in a number of ways. One way is to answer a question by saying "yes" or "no" in order to purchase the service if it cost a specified amount. These are known as discrete or dichotomous choice question. Another possibility is that the respondent provides answer with a point estimate of his/her WTP for the good or service known as continuous or open ended questions. In addition, respondents are asked iteratively whether they would be willing to pay a certain amount. However, repeated questioning (Bidding game) approach may annoy or tire respondents. As a result, they could say "yes" or "no" to a stated amount in hopes of terminating the interview. Further more, respondents may be shown 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. This approach has been criticized on the grounds that respondents might limit their announced WTP to the values listed on the card.

The most widely used approach to eliciting information about the respondent's WTP is the so called dichotomous choice format. This approach has also been shown to be incentive compatible: provided that respondents understand that provision of the good depends on the majority of votes, and the respondent's own vote in itself can not influence such provision, truth-telling is in the respondent's best interest (Hoehn and Randall, 1987).

In this study we use both open ended and dichotomous- choice formats which may provide the lower and upper valuation boundary estimates. Moreover, dichotomous choice approach is selected mainly because it has an advantage of putting the respondent in a more market like decision making and it gives less opportunity both for the interviewer and the respondent to purposefully influence survey results. Open ended approach has also the advantage of providing more information per respondent and allows for a simpler comparison of WTP responses. However these approaches are not without problems (see the disadvantages in Willis et al, 1999; Haab and McConnell 2002).

2.1.3.4.2 Acceptability and Bias Issues

Although CV is the most frequently used non-market valuation technique for environmental goods, debate persists over the reliability of CV and the overall suitability of non-use (passive use) values in economic policy analysis. Consequently, different groups have voiced their opposition by lobbying against the use of CV by investigating its reliability and the nature of passive use value. As a consequence, there has been a fundamental rethinking of many of the key issues related to assessing the benefits of environmental amenities so as to improve the quality of CV results.

Assessment for the technical acceptability of CVM involves looking at various methodological issues. They are issues of reliability, validity and bias. Validity refers to the degree to which the CVM evaluation correctly indicated the true value of the asset under investigation (bias is a common cause of low validity). Reliability refers to the consistency or repeatability of CVM estimates. Reliability as opposed to validity is an index of the reproducibility and stability of a measure. For CV studies, the index that is relevant for policy purposes is the stability of WTP measures over time.

Problems related to questionnaire design and the way in which questions are presented can introduce biases from the true value of the respondent's WTP which can affect the reliability of the CV survey. On the other hand, the result of CV study would be credible to policy makers if and only if the researcher have ensured that prospective consumers understand what they are being asked to value, how it will be provided, and how it will be paid for.

In regard to this, familiarity with good is a necessary prerequisite to provide meaningful responses to CV questions. The rationale given for needing familiarity is the assertion that respondents can not have well defined preferences in an economic sense for goods with which they have no direct experience. It is also important that the scenario presented appears to be as realistic as possible to the respondents.

According to Tietenberg (1992), a major concern with the use of CV is the potential for survey respondents to give biased answers. More over, the way in which questions are asked may have effects that need the researcher's attention. The most important sources for biased results are:

Strategic bias: The problem of getting individuals to reveal their true preferences when they can obtain benefits by not telling the truth, in the hope of either "free rider" or in order to ensure the provision of the good.

Hypothetical bias: - The hypothetical nature of the market in CV studies can render respondents answers meaningless if their declared intentions can not be taken as accurate guides of their actual behavior.

Payment Vehicle bias: - Results may differ depending on whether the payments are direct such as fees, or indirect such as taxes.

Information bias: - The quality of information given in a hypothetical market scenario could affect the responses received.

Scope and embedding effects ("Part-whole bias"):- When respondents are insensitive to the magnitude to the amenity being valued, in which case variations in payments will be small no matter how much the scope or magnitude is varied.

Warm –glow: - occur when the answer is an expression of sympathy, rather than the "true" WTP.

Others: - Include aggregation bias, interviewer and respondent bias, starting point, anchoring and discrete bid level bias.

Despite these problems, CV has been the most widely used method probably because it is the most flexible and the only way to estimate economic value of virtually any thing (use values, existence values, option and bequest values). Besides, most of these problems can be eliminated through proper planning and executing our surveys.

2.2. Empirical Literature Review

CVM has extensive application in recent years in valuing the benefits obtained from environmental quality improvements; in terms of reducing air pollution, tourism, forestry projects, out door recreations and optional or existence value of ecologically important species. In connection to this, Cropper and Alberini (1998) confirmed that the World Bank, the United States Agency for International Development and other donor agencies have taken an interest in CV as a means of assessing the demand for sanitation services, improvements in water supply, the benefits of establishing national parks and the costs/ benefits of restricting land use to reduce tropical deforestation in developing countries.

However, there have only been a few CVM applications to measure the value of urban forests in monetary terms. As cited on the works of L. Tyrvainen (2001), Dulyer et al. (1989) measured the WTP of urban dwellers in US for trees in urban recreational areas. Bishop (1992) in the UK and Elsasser (1994) in German has applied the method to recreational use of forests at the urban fringe. In Finland, the CV method has been used by Sievanen et al. (1991) for estimating the benefits of regional recreation areas on the outskirts of Helsinki. Here, visitors to the luukkaa recreation area (north of Helsinki) were asked to pay a hypothetical entrance fee. Tyrvainen and Vaananen (1998) have applied the method in urban forests for estimating the benefits of wooded recreation areas as well as woodland parks in the home environment (ibbid). Thus, this review looks at the applications of CVM on valuation of non-market forest benefits.

2.2.1. CVM on Forest Resources

Loomis, Gonzalez-Caban and Gregory (1996) elicited preferences of Oregon households for reducing fire hazards to old growth forests in the Pacific North West. They applied CVM to estimate individual's WTP by creating a simulated market. The simulated market was conveyed in a mail questionnaire.

Two versions of the survey were sent to two random samplings of 500 Oregon households each. The survey did receive nearly 50 percent response rate. In version 2, respondents were reminded, before they answered the WTP question, about other substitute resources and their budget constraint; in version 1, respondents were not reminded. The results and response rates between the two versions were almost identical. Hence, it leads us to believe that individuals took their budget constraint in to account when answering WTP even without being reminded.

They also used two CVM response formats, and found that mean WTP estimated from dichotomous choice responses ($92 for version 1 and $ 98 for version 2) was greater than mean WTP from open ended responses ($33 for version 1 and $ 36 for version 2).And the WTP amount from both response formats were statistically different from Zero. This result is consistent with many other studies of CVM using these two elicitation formats. When generalized to the whole state, the estimated total WTP of Oregon residents was found to range from $49.6 to $ 99 million.

In this survey, many people indicated that they were opposed to any new government programs. But this opposition is a difficult issue that must be dealt with in future focus groups and survey pre testing. Therefore, the authors concluded that conducting in- person interviews are more promising since respondents can clearly focused on the economic issues of the study.

L. Tyrvainen (2001) has measured the "residents" WTP for urban wooded recreation areas and small forested parks contributing to the quality of the home environment in two different urban areas was sent to 500 randomly chosen residents of the two towns who are between 15-75 years of age.

In both towns, urban forests were seen as clearly reducing positive benefits rather than causing negative effects. The result shows that more than two-thirds of the respondents were willing to pay for the use of recreation areas. Good location and active management raised the average WTP. Moreover, approximately half of the respondents were willing to pay for preventing construction in urban forests. The result also shows that the monetary value of amenity benefits in recreation areas is much higher than the present maintenance costs.

The study has also identified that the main values were related to nature and social functions of forests. In contrast, timber production achieved a distinctively low priority in both towns. Another important result obtained from this study is that urban forests are seen more as producing multiple benefits than causing negative externalities. Finally, the authors stress on the importance of defining urban forest policies for municipalities in Finland.

Loewn and Kulshereshtha (1996) have used the technique to measure the amenity values of Sakatchewan wilderness area of Canada. Tobit model was used to estimate the residents' willingness to pay for the preservation of the forest. As expected from our common sense, the result shows that income has a positive relation ship with the respondents WTP amount and the WTP amount was significantly determined by their education level. Where as the variable age was found to affect it negatively.

The result of their study has also indicated that 58 percent of the respondents are satisfied with the existing protection of that area while the remaining 42 percent demand for more protection. And Sakatchewan residents have stated a total willingness to pay amount of USD 15.3 million per year for the preservation of this forest area.

Walsh et al. (1990) has used the technique to estimate the value of protecting ponderosa pine on national forests in the front range of the Colorado Rocky Mountains and it has confirmed that the general public is willing to pay for forest protection programs. In this study, respondents were asked to decompose the total non-market value of the forest in to four categories (recreational use, option, existence and bequest values). The result from this survey showed that use values accounted for 27.4 percent of total value and non-use values (including option, bequest and existence values) accounted for 72.6 percent of the total value.

Scarpa, R. (1999), has assessed the amenity value of forests, with application to Wisconsin and Ireland. In the Irish application, data from a large scale forest recreation survey are used to estimate models of stated WTP for forest recreation from discrete choice contingent valuation. An estimated model is used to predict benefits from creation of nature's reserves in forests currently without one. The reliability of benefits transfer from CV models is investigated. Benefit estimates from CV analyses are compared with analog estimates based on the TCM. In both sets of estimates the effect of forest attributes is investigated. Finally, welfare estimates are compared across methods and with alternative quality indices of aesthetic value. Benefit estimates are found to be congruent with economic theory and positively correlated. CVM is found to produce benefit estimates often transferable between forests.

Generally, the literatures discussed above suggest that CVM has shown promise as a powerful tool to measure the economic benefits of environmental goods and services. It is also indicated that this method is widely used in valuing improved forestry projects. However, only few applications of CVM can be identified in Ethiopia and out of these, no application of this method is made on urban forest amenities. Hence, this study will hopefully contribute something to this area of study and also to the little experience of using CVM for valuing natural resources in Ethiopia.

CHAPTER THREE

3. Methodology

3.1. Data Type and Source

This study uses mainly cross-sectional data set obtained from a primary source by using contingent valuation method and in some cases secondary data is used. Primary survey research method is employed by directly asking questions through face to face interview. The interview was conducted at their respective residents in October 2006. The survey was carried out amongst randomly selected samples of 270 households. But in the process of data analysis, 20 questionnaires were not found to be accepted (see section 4.1 for the reasons). Thus, only the remaining 250 questionnaires were qualified for analysis. Of course, the study is also supplemented by other relevant secondary data obtained from both governmental and non-governmental institutions such as Environmental Protection Authority (EPA), and Clean and Green Addis Development Plan (CGADP).

Respondents were asked their WTP amount so as to improve the amenity service provided by the urban forest of the stated site. Apart from this; some other variables which may describe the household characteristics were collected and hence it enables us to relate WTP with socio economic and demographic factors.

Estimation of this benefit doesn't omit option and existence values as well as benefits enjoyed by people who never actually visit the site. Hence, both users and non-users are considered. Therefore, generalization would be made to the total number of households in Addis Ababa.

3.2. Sampling Design

Attempt was made to include all (10) sub cities of the city in our survey. But due to financial constraints and some other reasons stated on the previous sections, only 5 sub cities (Gullele, Arada, Addis Ketema, kirkos and Bole) were randomly selected by lottery method. Following the same technique, we had selected one kebele from each sub cities. The selected kebeles were: 10, 11, 12 (from Gullele); 11, 12 (Arada); 10, 11, 12 (Addis Ketema); 13, 14(kirkos) and 02 (Bole). Assuming that the households in each kebeles are homogeneous in their characteristics, a total of 270 households were randomly selected from different clustered groups based on streets, blocks and some other features of the above stated kebeles. That means multi stage sampling technique was used to draw samples from the entire households in the city.

Since the recent restructuring of the city, different kebeles has merged and hence list of households (even household size of the kebeles) were not available. However, based on the 2001/2002 population estimates of the kebeles and by taking the average household size of Ethiopia which is 4.8 (Central Statistics Authority, 2001/2002) as proxy for Addis, it was able to estimate the average household size of these kebeles. Then, proportional sizes of households from each kebele were selected by multi stage sampling in which it does not require a complete list of members in the target population.

This method is widely applied in many social researches due to its advantages in terms of convenience, economy and efficiency.

3.3. Questionnaire Design

The preparation of the CVM questionnaire generally followed the Mitchell and Carson techniques with few modifications to adopt the study area (sea Mitchell and Carson, 1989). It consists of 5 different parts (see appendix VI). When designing the survey care was taken to make it interesting for both users and non-users of the proposed urban forest program. It starts with section A, asking respondents about their acquaintance, knowledge and opinion towards environmental issues in general and Entoto urban forest in particular. This section will hopefully provide useful information concerning the availability, access, attitude and awareness of the dwellers towards such environmental services.

Section B included two parts. In the first part respondents are presented rather short description of the major problems facing the forests in Addis Ababa and the proposed program to curb out these problems. The described scenario is real and hence respondents are told that the problem would actually be solved, there by excluding the credibility dimension of a certain intervention. Furthermore, respondents are also demonstrated with visual aids (pictures on appendix VI) so as to understand the current status of the forest and the proposed improvements. The second part of this section involves dichotomous choice (DC) and open-ended questions. In the DC question, four different bid amounts (i.e. Birr 3, 5, 8, and 12) were randomly assigned to survey respondents. Hence, it is able to estimate the mean WTP and parameters on the basis of observed data from open-ended questions and "Yes/No" answers of the DC question.

Following the WTP questions, we have one more question which is designed to investigate the main reason of those respondents who are not willing to pay any amount. The response to this question will help us to determine whether it represents a valid value or a protest to some feature of the simulated market. This question is therefore useful to identify respondents representing valid reasons for not being willing to pay from those whose responses represent rejection of the basic premise of the simulated market.

Section C consists of follow-up questions in which respondents are asked how confident they are to their respective answers for the WTP questions, about reliability of the program to them and some other questions which may provide information about validity of the survey. Moreover, the respondents will be asked for what particular dimensions they considered in ranking their preferences. This will reveal with identifying which value (use or non-use values) of urban forests are more interesting to them.

Socio-economic and demographic factors of the respondents are also expected to affect mean WTP. Hence, questions related to this issue are involved in section D. During the pilot survey, respondents were found to be reluctant to give information regarding their household income which is one of the major expected factors that may affect WTP. Hence, by in corporating other questions such as number of unemployed household members and the respondents monthly income, and then by soliciting their responses, we were able to get more reliable answers. The last part of this questionnaire (section E) was left to the enumerators so as to cross-check and then to make corrections if conflicting and /or inconsistent responses were provided.

The contents of the questionnaire for each of the respondent are the same, with the exception of setting different bid amounts. Equal numbers of the four bid amounts were distributed randomly at the selected kebeles of the city.

3.4. The Field Work

The CVM questionnaire was interviewed in October, 2006 in Addis Ababa to 270 randomly chosen residents above 18 years of age. The vector of bids established in the DC part of the questionnaire were first determined by making focus group discussions, which uses an open-ended survey to establish the relevant bids (or the most likely range of bids and likely mean) and likely proportion of positive responses to them. Because, the correct number and size of bid is vital if calculation of the true mean WTP is to be performed accurately. And also estimating the appropriate bids is very essential in order to offer bids for acceptance or rejection. Thus, the focus group discussion was made at 3 kebeles of the city and at each site discussion was made among 7 to 10 persons. These discussions were used to explore issues by soliciting opinions and hence great effort had been exerted to determine the relevant bids by reducing the presumed starting point bias.

During these discussions, different answers were observed ranging from birr 0 to 15 per month. However, it reveals that 3, 5, 8 and 12 Birr/ month are the most frequent bids. Next, all contents of the questionnaire was pre-tested through pilot study. Six households from each of the selected kebeles and hence a total of 30 respondents were included in the pilot study. The purposes of making these tests before the main survey was to determine the appropriate payment vehicle, to see whether the questionnaire was logical and, in particular, if the WTP questions were understood correctly. Generally, it is useful in restricting the questionnaire formats and in adjusting some contexts. However, the pretest results were not included as an input in the final analysis.

The final questionnaire was ready for survey after making some adjustments based on the observations from this field works. In this survey 5 experienced interviewers and two supervisors were involved after they have been trained on all contents of the questionnaire, about their roles and responsibilities.

3.5. Description of Explanatory Variables and Testable Hypothesis

The contingent valuation study is designed to test the expected impact of the explanatory variables on WTP. Therefore, by setting our hypothesis on the variables that may affect WTP, it will help us to see the relationship between the result obtained from multivariate analysis with that of economic theory and common senses. Some of these variables which are expected to determine households WTP are given below.

- Household's monthly income (INC) is positively related with WTP and it is also expected to be a strong determinant factor in explaining WTP.
- Respondent's level of education is expected to have a positive relation with WTP. That means, educated respondents have more preference for improved amenity service and are willing to pay more. It is a dummy variable represented as:

  EDUP = 1 if the respondent's educational level is primary education (grade 1-6); 0 otherwise

  EDUS = 1 if secondary education (Grade 7-10); 0 otherwise

  EDUT = 1 if above secondary education (Grade 11 and above); 0 otherwise

- Reliability of implementing the proposed project (RBP) on urban forest development has a positive influence on WTP. It is a dummy variable taking 1 if the respondents believe in the implementation of the project; 0 otherwise

- The initial bid amount (BID) indicated on the dichotomous choice question may create bias while respondents state their maximum WTP amount. Hence, the relation ship between this variable and WTP amount is positive. On the other hand, respondents' willingness to spend money for improved urban forest amenities is expected to decrease as the initial bid amount increases.

- Respondent's access and availability to visit other recreational sites (AVO) is also expected to affect WTP. Since we don't know if there are other recreational sites available for the respondent and the type of service they provide, it is difficult to expect a specific sign. However, availability and access to visit other recreational areas is negatively or positively related with WTP depending on whether it is substitute or complementary to the recreational service provided by Entoto forest. AVO is a dummy variable taking 1 if respondents have the access and availability to visit other recreational sites; 0 otherwise.

- WTP depends on environmental quality (EQ) of the stated site. It is a dummy variable taking 1 if respondents have Interest towards massive attributes of variety tree species; 0 otherwise.

- WTP is also influenced by the respondent's attitude towards carrying the burden (responsibility) while conserving urban forests. The variable, Primary responsible body (RES) is thus a dummy variable taking 1 if respondent believe that the community is the primary responsible body ; 0 otherwise

- House hold size (HHS) is expected to have a negative relation with WTP. Because large families are more likely to have large number of children and hence each family members would have low per capita income.

- Future place of residence of the house hold (RSD) would affect WTP. RSD is a dummy variable taking 1 if the household expects to live permanently in Addis; 0 otherwise. Because permanent settlers have a chance to enjoy benefits obtained in terms of both use and non-use values of urban forests.

3.6. Scope and Limitations of the study

The scope of the study is limited to the applications of the CVM for evaluating the amenity value of urban forest in Addis. It doesn't include all forests around the city and other benefits that can be obtained from urban forests such as wind defluxion, treating waste water, pollution reduction, improving atmospheric air etc.... are not included here.

Further more, this study doesn't consider the costs associated with the development and preservation program of the specified area.