A STUDY ON THE DEMAND FOR ECOTOURISM USING NON-MARKET VALUATION METHODS: THE CASE OF KAZIRANGA NATIONAL PARK

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Certified that the thesis entitled "A Study on the Demand for Ecotourism using Non-Market Valuation Methods: The Case of Kaziranga National Park" being submitted by Sri Abinash Bharali to Assam University, Silchar - 788011, India, for award of the Degree of Doctor of Philosophy in Economics is the outcome of a bonafide research work, carried out under my supervision. This work has not been submitted previously for any other degree of this or any other university. It is further certified that the candidate has complied with all the formalities as per the requirements of Assam University. I recommended that the thesis may be placed before the examiners for consideration of award of the degree of this university.

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DECLARATION

I, Sri Abinash Bharali bearing Registration No. Ph.D./1009/09, dated 27/10/09, hereby declare that the subject matter of the thesis entitled "A Study on the Demand for Ecotourism using Non-Market Valuation Methods: The Case of Kaziranga National Park" is the record of work done by me under the guidance of Dr. Ritwik Mazumder, Assistant Professor, Department of Economics, Assam University, Silchar and that the contents of this thesis did not form the basis for award of any degree to me or to anybody else to the best of my knowledge. The thesis has not been submitted in any other University/Institute.

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PREFACE

The present study is carried out to estimate economic or recreational value of the Kaziranga National Park, because with the emergence of 'sustainable development' strategy it is very much essential to estimate true economic value of the environmental resources and services, and only a hand full studies have been conducted in North Eastern Region of India.

On the other hand, resources are allocated according to the value of the assets in an economy. Without proper estimation of value, resources are bound to be misallocated. For proper management of public parks and wildlife sanctuaries in the developing countries like India, there is an urgent need to estimate the true economic value of these assets. The economic value of the environmental resources and services helps the policy makers in making and implementing more meaningful policies regarding resource utilization and allocation.

National parks and wildlife sanctuaries have played an important role that balances the needs for biodiversity conservation against degradation of environmental conditions of different countries while keeping the rapid pace of development. Recently these parks are provided for recreational activities on leisure demands of the people. In the present situation due to increased recreational pressure and the consequent damage to the environment, management of these parks comes under close scrutiny. So, it needs economic valuation, but it is not straightforward since this kind of public service is not

directly sold to the visitors for a price. On the other hand, these environmental resources or services are characterized by non-excludability and externality. For these characteristics the market system cannot capture all aspects of these resources. Therefore, these recreational or biodiversity services are mispriced by the market and the policy makers should use a new valuation approach to assess the value of these resources namely non-market valuation methods. Non-market valuation methods provide data and help the policy makers to take decisions on how best to manage the natural resources. Two common approaches to the non-market valuation are Travel Cost Method (TCM) and Contingent Valuation Method (CVM) generally used for assessing economic value of environmental resources. In the present study, both methods are used to estimate recreational value of the Kaziranga National Park (KNP) of Assam.

The present study is arranged and demonstrated in six different chapters. General introduction of the study is elucidated in the Chapter-1. In this chapter, rationale and basis of the present study, definition of ecotourism and importance of it in developing countries, purpose of the study, objectives, hypotheses and conceptual framework of the research work are explained in detail. The purpose of this section is to present a comprehensive view of the basic ground and necessities of economic valuation of public parks in developing countries like India.

Chapter-2 of the thesis entitled ‘Review of Literature’ unfolds in-depth explanation of various research works which are conducted in foreign countries and also in India since 1980s. This is followed by a discussion on the research gaps of the previous studies

which are carried out to estimate recreational value of the Kaziranga National Park (KNP).

Chapter-3 pertains to Kaziranga National Park. It discusses regarding the present status, geography, climatic condition, history and development, flora and fauna, wildlife management system of the park. It is followed by constraints of the management system of KNP and a brief discussion on works of the NGOs related to the park management system, it presents a clear picture of the present conditions of the national park.

In Chapter-4 of the thesis, entitled 'Methodology and Data', the principal topics discussed are: various types of non-market valuation methods and its drawbacks, process of selecting samples and relevant information for the present study, and the background and procedure of selecting particular methods to attain the objectives of the present research work.

In Chapter-5 of the thesis, an analysis of results of the present research work has been furnished. It is divided into two different parts: descriptive statistical analysis and econometric analysis. Descriptive statistical analysis part presents the results on socio-economic characteristics or background of tourists and in the second part findings are presented according to the objectives of the study.

Chapter-6 relates to suggestions and policy implications of the present research work, which are drawn on the basis of information collected from tourists of the national park. It is followed by the conclusion part of the study.

CONTENTS

LIST OF TABLES

LIST OF FIGURES

A Study on the Demand for Ecotourism using Non-Market Valuation Methods: The Case of Kaziranga National Park

Abstract

The National Parks and Sanctuaries are characterized by non-excludability and externality. For these characteristics the market system cannot capture all aspects of these resources and these resources are mispriced by the market. In the developing economies like India resources are allocated according to the value of the asset, without proper estimation of value or true economic value of these assets resources are misallocated. For these reasons the policy makers should use a new valuation approach to assess the value of these resources namely non-market valuation methods. In the present study, both travel cost (TCM) and contingent valuation methods (CVM) are used to estimate use value or recreational value of the Kaziranga National Park of Assam. Kaziranga National Park is a famous eco-tourist destination of north eastern region of India. For this purpose 230 visitors are interviewed randomly, which is 3% of the average total tourist flow to the park in a particular month during the last three years (i.e., from 2007-08 to 2009-10), using a structured schedule with a single respondent from each group or family chosen in the sample.

Using Zonal Travel Cost Method, it is estimated that total consumer surplus is around INR 3.21 million and this surplus indicates the amount that the visitors are willing to

pay over their actual cost to participate in the recreational activities of the National Park. It is also found that the park authority can increase the entry fee to INR 187.60 from the current level of entry fee to maximize the revenue collection and can collect INR 24.3 million additional revenues. These additional amounts of revenues can be used for management of the national park.

It is found that 84 percent of the total sample visitors willingly want to contribute some amount of money for protection and conservation of KNP. Mean WTP for maintenance of KNP is to be INR 49.5 and INR 51.97, which are estimated by using dichotomous type and open-ended contingent valuation methods, and economic value of the park is estimated around INR 5.58 million and INR 5.86 million respectively.

Both the CV methods give almost similar results regarding WTP estimate, but the estimates of ZTCM is smaller than that of the CVM, because decisions regarding WTP and expenditure for the trip to KNP are taken at two different point of time and ZTCM captures only Indirect use value, but CVM captures not only indirect use value but also bequest value.

Convergent validity test is carried out in the present study to test the reliability of CVM estimates by means of two ways: calculating the ratios of the estimates of CVM and ZTCM, and Pearson correlation coefficient is analyzed for the estimates of open-ended CVM and ZTCM. It is found that the ratio between the estimates of dichotomous choice of CVM (DCCVM) and ZTCM is around 1.7 and between the estimates of open ended CVM (OECVM) and ZTCM is almost 1.8. It is also found that the estimates of

OECVM and ZTCM are highly correlated (0.68) at 95% level of significance and suggest that if ZTCM estimates are systematically varying across different zones with the nature of the good being valued, then OP type of CV estimates are also changed in the same direction or vice versa.

Poaching of one horned Indian rhinoceros is a enormous problem in KNP and by using the open ended CVM, it is found that economic or recreational value of the park is reduced by INR 2.67 million if poaching of this wild animal is continuously going on or it also reflects the existence value of this unique wild animal in the national park.

It is found that around 42% of the total sample tourists want to visit again the park. Travel costs of the trip and age of the respondents negatively affects possibility to visit the park again, and monthly household income and education level of visitors positively affects it.

Keeping in view the large amount of consumer surplus and the recreational or economic value of the park, Government of India and Assam should allocate large budgetary resources for the protection and preservation of wildlife and biodiversity of KNP. The park authority can also introduce the revenue maximization entry fee and by implementing this policy, the park authority can collect additional amount of revenue which is far higher than the current level of revenue collection. The collected additional amount of revenue can be used for preservation activities of the unique wild life of the park especially by technological up-gradation and by recruitment of zoologists, ecologists, veterinary doctors and armed security personnel. So, Government should

develop and implement proper scientific management policy for protection and conservation of the park. It is hoped that this study will pave the way for future research work in the field of valuation of environmental resources, endangered species or animals and places of historic interest of not only the North East but throughout the rest of India.

Chapter 1

1.1 Introduction

With the realization of the need for conservation of environmental resources or services, various efforts were made in this direction both by developed and backward countries. One of them was identification, declaration and adoption of areas with unique, natural environmental conditions and biodiversity and their development as National Parks and Wildlife Sanctuaries. Legislations have been made and attempts were made for their strict enforcement to minimize the human interference in these areas. But all these efforts did not prove to be as effective as they were expected to be. This necessitated the development of novel strategies like “Ecotourism” which has the potentiality of integrating the conservation of natural resources or services along with the protection of socioeconomic interests of the local people.

In market economics, prices of the resources provide signals on scarcity. These scarcity prices provide the true measure of economic value, only if the market is characterized by large number of buyers and sellers, and transferrable private property rights with the consumers revealing their choice from a number of rival goods and services, given adequate amount of information on the present and the future. If these conditions hold good, the price system can efficiently direct the process of resource allocation.

Unfortunately for public parks and sanctuaries, market fails or they are of limited use. These parks supply a flow of direct and indirect services to the society. But, many of their services remain un-priced by the market. For example, the market price of a forest does not generally account for the natural beauty, flora and fauna and wildlife habitat services. These resources or services are characterized by non-excludabilities and externalities, which prevents the market price from capturing the correct signals about true economic value of the environmental resources in question.

In an economy, the resources are allocated according to the value of the assets. Without proper estimation of value, resources are bound to be misallocated. For proper management of public parks and sanctuaries in the developing countries like India, there is an urgent need to estimate the true economic value of these assets. The economic value of the environmental resources and services helps the policy makers in making and implementing more meaningful policies regarding resource utilization and allocation. Various environmental economists have developed different methods to assess the true economic value of these non-marketed resources and services and generally these methods are called non-market valuation methods.

1.2 Ecotourism

Tourism is a multi-dimensional concept. ‘Tourism’ is one of the world’s largest industries with a growth rate of 5 percent per annum over the past twenty years (Chawla, 2004). For the tourist it is travel, relaxation, a holiday, an expose to other culture and traditions. Conceptually it is an amalgamation of phenomena and

relationships arising from the movements of people “to” and their “stay” at the different destinations. The “journey” (a dynamic element) and “stay” (a static element) are the two necessary constituents of the phenomenon called tourism.

Ecotourism is a form of tourism that is inspired primarily by the natural history and the environment of an area and it is entirely a new approach in tourism industry. Ecotourism encompasses travel to usually exotic places with specific purposes of enjoying and admiring wild life and to have firsthand experience of encountering undeveloped, relatively undisturbed natural areas as well as indigenous cultures. Ecotourism attempts to address concerns and interests around environmental, economic and social impacts of conventional, mass tourism. According to the International Ecotourism Society (2001), ‘‘Ecotourism is a responsible travel to natural areas that conserves the environment and improves the welfare of the local people’’. Thus ecotourism is a nature-based and responsible travel involving education, interpretation of the natural environment and management of ecological sustainability, with a holistic purpose of conservation and promotion of welfare of the local people. There are seven principles of ecotourism, they are as follows:

(1) Avoids negative impacts that can damage or destroy the integrity or character of the natural environment.

(2) Educates the traveler on the importance of conservation (natural resources, biodiversity).

(3) Directs revenues to the conservation of natural areas and the management of protected areas.

(4) Brings economic benefits to local communities and directs revenues to local people living adjacent to protected areas.

(5) Emphasizes the need for planning and sustainable growth of the tourism industry, and seeks to ensure that tourism development does not exceed the social and environmental 'carrying capacity'.

(6) Retains a high percentage of revenue in the host country by stressing the use of locally-owned facilities and services.

(7) Increasingly relies on infrastructure that has been developed sensitively in harmony with the environment – minimizing use of fossil fuels, conserving flora and fauna.

A fundamental requirement for ecotourism to be practiced is control on access to an area. Various hill stations or beaches therefore do not get categorized as eco-tourism destinations because it is impossible to control access to them. National Parks and Wildlife Sanctuaries are, on the other hand most amenable to regulate access and thus most suitable to develop as eco-tourist destinations. But National Parks and Wildlife Sanctuaries wherever established have often displaced local communities, especially tribal's and restricted their livelihood options. This has left the poor local communities still poorer and often without a viable recourse. Therefore conservation of the natural

resources has to be balanced with the economic development of local communities within or on the periphery of a protected area. Ecotourism, can been made a most effective instrument in bringing about the balance where local livelihoods actually benefit from improved conservation of the natural resources or services.

1.2.1 Purpose of Ecotourism

It is twofold: provide exciting, challenging educational trips to exotic locations like wet tropical forest, wind-blown deserts, high mountain passes, mid ocean coral reefs for admiring and enjoying the scenery, the animals and the nearby located culture; conserve the vast, natural habitats and wild life; the second purpose is unconsciously promoted by eco-tourists through small deeds like paying for park admissions, engaging local guides, staying at local lodges and dormitories, eating at local restaurants, uses local transportation services etc. These small activities of eco-tourists do significantly contribute to the economic development of local people also because their needs are satisfied with the income earned in serving the eco-travelers and hence do not resort to "harvesting" the short-term benefits like cutting down forests for lumber, hunting animals for meet or any pet trade.

1.2.2 Ecotourism in India and North East India

India is endowed with a rich and varied bio-diversity distributed over its geographic area. A few places like the Himalayan Region, Kerala, the north-east India, Andaman & Nicobar Islands and Lakshadweep have the treasured wealth of the Mother Nature.

Table 1.1 Major Eco-Tourist Destinations of North-East India

Assam	Arunachal Pradesh	Manipur	Meghalaya	Nagaland	Tripura	Sikkim	Mizoram
(a) Guwahati	(a)Tawang	(a)Kangla	(a)Shillong	a)Kohima	(a)Agartala	(a)Gangtok	(a) Aizawl
(b) Kaziranga National Park	(b)Bomdila	(b)Hiyangthang Lairembi	(b)Cherrapunjee	(b)Kahima War Cemetery	(b)Ujjayanta Palace	(b)Kanch-Endzonga	(b)Tamdil Lake
(c)Tezpur	(c)Tipi	(c)Sahid Minar	(c)Mawsynram	(c)State Museum	(c)Neermahal	(c)Tsomgo lake	(c)Champhai
(d) Sivasagar	(d)Itanagar	(d)Zoological Garden	(d)Jakrem	(d)Dzukou valley	(d)The Fourteen Goddess Temple	(d)Nathula Pass	(d)Lunglei
(e) Majuli,	(e)Namdapha Wildlife Sanctuary	(e)Keibul Lamjao National Park	(e)Monoliths in Khasi		(e)Unakoti		(e)Bung and Paikhai
(f) Nameri National Park	(f)Parasuram Kunda	(f)Loktak lake	(f)Balpakram National Park				
(g) Manas National Park		g)Shree Govindajee Tample	(g)Nokrek Biosphere and Seju Cave				
		(h)Red Hill					

Source: Author's own findings.

Thenmala in Kerala is the first planned ecotourism destination in India created to cater to the eco-tourist and nature lovers. The topography of India boasts an abundant source of flora and fauna. India has numerous rare and endangered species in its surroundings. The declaration of several wild life areas and national parks has encouraged the growth of wild life resources, which reduced due to wild life hunt by several kings in the past. Currently, there are about 80 national parks and 441 wildlife sanctuaries in India, which work for protection and conservation of wild life resources in the country.

The North Eastern region has tremendous potential for developing the ecotourism industry. The rich natural beauty, exotic flora and fauna serve as invaluable resources for the development of eco-tourism in the region. The entire region is endowed with diverse tourist attractions and each state has its own distinct features. Presently, in Assam, there are about 5 National Parks and 17 Wildlife Sanctuaries located across the length and bread of Assam. The main sites for tourist attraction in the North Eastern region are depicted in Table 1.1

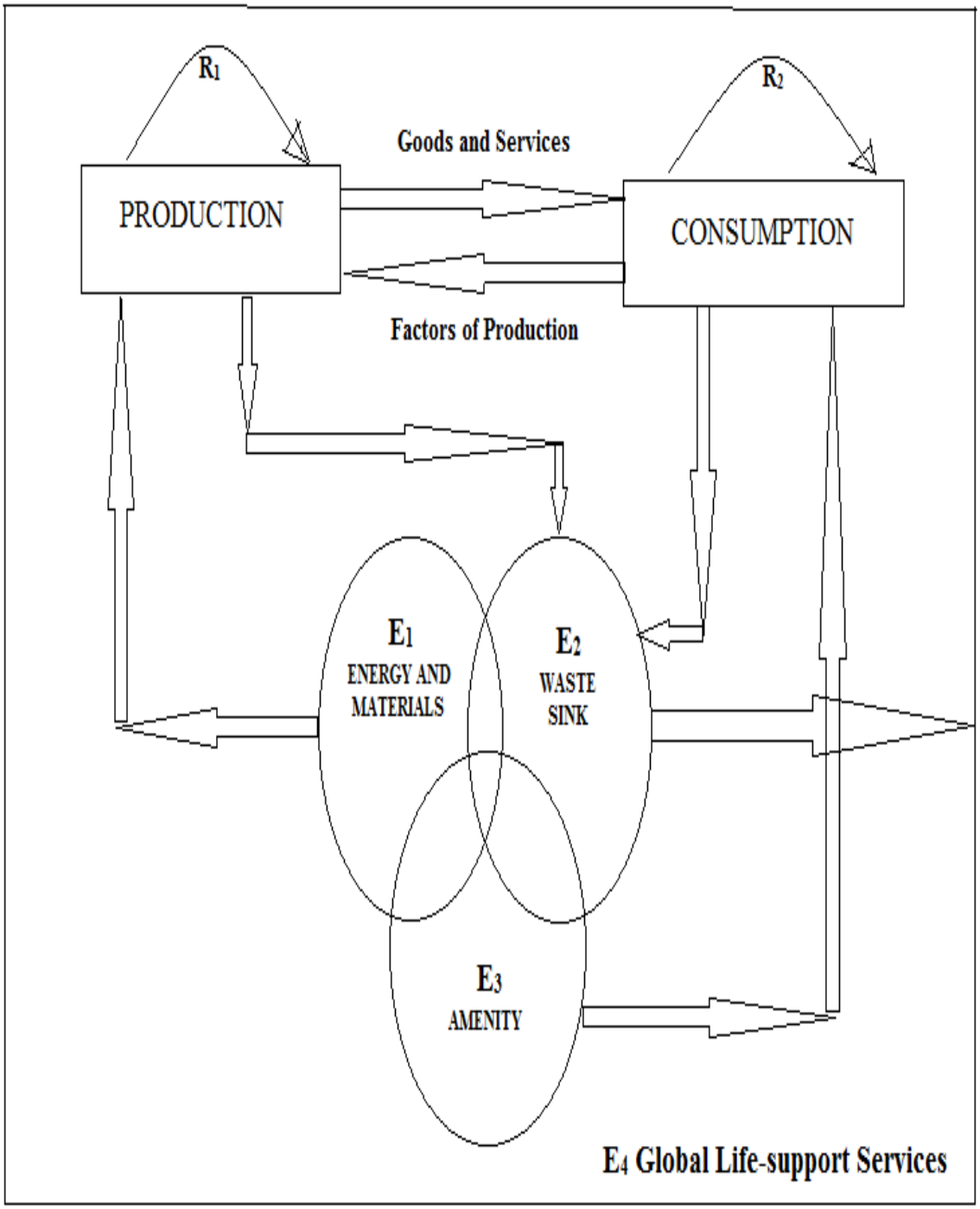
1.3 Inter Linkages between the Economy and Natural Environment

Every economic action can have some effect on the environment and every environmental change can have an impact on the economy. Economy is the population of economic agents, the institutions they form (which include firms and governments) and the inter linkages between agents and institutions, such as markets. On the other hand, environment is the biosphere, the 'thin skin on the earth's surface on which life exists'. Thus the definition of environment includes life forms, energy and material resources, the stratosphere (high atmosphere) and troposphere (low atmosphere). Environment constitute the surroundings of man, who is both the creator, and molder of his own environment and whose prosperity, development and well being is leaded by the development of the economy. The inter dependencies between environment and economy gives various types of environmental problems, which threaten our entire life support system. The root cause of such problem lies in the wasteful use and misallocation of the environmental resources by the man in the verge of achieving growth and development.

A pollution free environment is very much essential for the survival of life on the earth. The environment is continuously polluted due to the almost all activities of human beings by contravening the environment's natural capacity to decompose and assimilate waste. Modern civilization is constantly consuming and /or destroying the natural resources – both consciously and unconsciously, to fulfill their needs. However, over the years human activities have created hazardous and life threatening conditions for all life forms on the planet.

Man and the environment are interlinked primarily in two ways. Environment supplies the raw materials and other basic necessities to man, while man in return generates and liberates all the wastes, pollution and threat to the environment in the course of their consumption and production activities. The environment plays a twofold role in serving the human civilization. On the one hand, it is the source of the inputs or materials which are used in the process of production for the consumption purposes of the human beings. On the other hand, it is the sink of all wastes or disposals which are generated in the process of production and consumption. The environment serves the economy by absorbing only up to a certain extent, all polluted matter that are generated by the production and consumption processes in the economy and tries to keep the ecosystem pollution free and safe for life forms. But, if the polluting processes continue without any control or limit then the rate of natural assimilation capacity of the ecosystem is surpassed by the rate of waste and pollutant generation. In such a situation the total stock of pollutants begins to grow which makes the environment hazardous for not only

Figure 1.1 Economy Environment Interactions



Source: Hanley, at al. (2007)

man but for all life forms on earth. Evidently, the growing stock of pollutants continues to hover over the entire globe and that is precisely why pollution and pollutants are not confined to geographical boundaries. This in a nutshell is the picture of today's world, where the environment and the natural ecosystem are being continuously degraded by the activities of man.

The interlinkages between the economy and the environment are summarized in Figure 1.1. Here the economy is subdivided into two sectors – production and consumption. Exchanges of goods, services and factors of production take place between these two sectors. The environment is shown here in two ways: as the three interlinked circles E_1, E_2 and E_3, and the all-encompassing boundary labeled E_4. The production sector extracts energy resources (such as oil) and material resources (such as iron ore) from the environment. These are transformed into outputs and out of these outputs some are useful (goods and services supplied to consumers) and some of which are waste products, such as CO, CO_2, SO_2, etc. There is some recycling of resources within the production sector, shown by the loop R_1 and within the consumption sector, as shown by the loop R_2.

Then the environment's first role is as a supplier of resources and second is as a sink or receptor for waste products. These wastes may result directly from production or from consumption. For instance when individual's dispose off their daily waste in some dumping area or when they use some automobile or motor vehicle, they add to the total stock of waste. In some cases, wastes are biologically and/or chemically processed by the environment. For example, organic emissions to an estuary from a distillery are

broken down by natural processes – the actions of micro-organisms – into their chemical components. Whether this results in a harmful effect or not on the estuary, depends on a number of factors, such as volume of waste relative to the volume of receiving water, the temperature of water and its rate of replacement, etc. The estuary has a limited assimilative capacity for the waste. As the level of organic input increases, the process of breaking it down will use up more and more of the oxygen dissolved in water, reducing the ability of the estuary to support fish. It is implying that up to a certain point, effects are not deemed important: only once the oxygen in the river drops below a critical level so that, for example, fish are no longer present, does the effect become 'significant' on some criteria. For some inputs to the environment, there are no natural processes to transform them into harmless or less harmful substances. Such inputs are termed as 'cumulative' and 'conservative' pollutants include metals such as lead and cadmium, and man-made substances such as PCBs (polychlorinated biphenyls) and DDT (dichloro diphenyl trichloro ethane). As development process gets momentum in an economy, the environmental problems also increases in a rapid pace. The main goal of a modern day development policy maker is to achieve welfare along with development in a limited time frame and this requires proper management of environmental resources. Both renewable and nonrenewable resource management is very much essential in the present situation for sustainability of human life in the earth. Economic valuation of environmental resources is an essential requirement for proper management of these assets.

1.4 Necessity and Scope of the Study

Demand for ecotourism actually reflects the demand for an improved state of environment or environmental quality. The expenditure (i.e., travel cost and other miscellaneous costs) on account of the trip to the desired environmental state reflects a money metric index of utility and is an indirect indication of the demand for better quality of environment. However, the willingness to pay for protecting a park or a forest also reflects the individuals' demand for a cleaner environment or a better quality of environment. All these reflect the monetary value of these resources. Valuation of environmental resources is so much necessary due to the following reasons:

Firstly, it is impossible to apply the principle of excludability for the environmental goods and services. Those who don't pay for enjoying these environmental goods and services cannot be excluded. As a result of this "free rider" problem exists and no incentive is taken to conserve natural environment which results in misuse or overuse of these resources. As they do not have any market, their prices are considered as equal to zero or the free goods of nature. In reality, they are not free goods; the demand for these goods is more than supply at zero prices which needs estimation.

Secondly, it is generally found a vast divergence between private and social value of environment, as in the modern world always individual preferences and public benefits create clashes. This requires that environmental policy should bring the difference to the minimum level. All economic decisions in an economy have some impacts on

environment. Thus, in all developmental policies and programmes environmental valuations are important.

Thirdly, if the stakeholders (example, common people and the Government) of the environmental resources and services come to know the economic value of these resources then they will became more aware regarding protection and conservation of these assets and this will obviously reduce degradation of these resources.

Further, sustainable development means it is a form of economic growth that would meet the needs and desires of the present without compromising the economy-environment systems capacity to meet them in the future. It needs maintenance of a constant natural capital stock for a long time and therefore this urges that the economic value of natural environment should be constant over time. It also needs economic valuation of these assets.

Public parks as representative of urban green areas have played an excellent role that balances the needs for city conservation against degradation of urban environment while keeping the rapid pace of urban growth. Forests are of crucial importance as they perform essential, social, economic and cultural functions. So, it needs social and economic valuation, but it is not straightforward since this kind of public service is not directly sold to the visitors for a price. Therefore, it is necessary to value the public park services by means of a new valuation approach namely non-market valuation. Non-market valuation uses the implicit and explicit trade-offs between conservation and development to assess the value of un-priced environmental resources and the

economist's job is to estimate its monetary value as accurately as possible. If an economist captures these trade-offs within a reasonable range of error, using non-market valuation methods, then he can provide data and help the policy makers to take decisions on how best to manage the natural resources. It is hoped that this study will provide vital inputs to research on forest preservation and valuation in the North East India.

1.5 Objectives of the Study

The study has been carried out with a few specific objectives and the objectives are listed below in order of priority. The justifications behind these objectives are well described in the section on 'Research gap' in chapter two (i.e. in the chapter on Review of Literature).

Firstly, the individual's demand for visits to Kaziranga National Park (i.e., the recreational value of KNP) is estimated using travel cost method. **Secondly**, the economic value of Kaziranga National Park is estimated using both Open Ended and Dichotomous Choice of Contingent Valuation Method (CVM). The study also tests the reliability of CVM estimates by means of Convergent Validity Test. **Thirdly**, the study estimates the influence of the existence of one horned Indian rhinoceros on the recreational value of Kaziranga National Park. **Fourthly**, the study estimates the influence of travel cost and selected socio-economic characteristics of the tourists on the willingness to visit KNP again.

1.6 Hypotheses

As a direct upshot of the four objectives already mentioned, the study considers five hypotheses. They are sequentially arranged below as because they are all logically related.

(A) Demand for visits to Kaziranga National Park (KNP) is not influenced by travel costs of the trip to KNP and socioeconomic characteristics of the tourists.

(B) Willingness of tourists to contribute for park maintenance is not influenced by amount of contribution (i.e., offer price or bid level) and socio-economic background of the tourists.

(C) Maximum willingness to pay (WTP) for maintenance of KNP cannot be explained with the help of selected socio-economic variables of the tourists.

(D) The existence of One Horned Indian rhinoceros does not have any influence on economic value of Kaziranga National Park.

(E) Willingness of tourists to visit again is unrelated to the travel costs and socio-economic background of the tourists.

Logically these objectives and hypotheses are an offshoot of the review of literature that is presented in the chapter two following this introductory chapter. A research gap as per existing literature is also discussed there. In brief it may be argued firstly that very few numbers of studies have carried out in India on valuation of public parks and

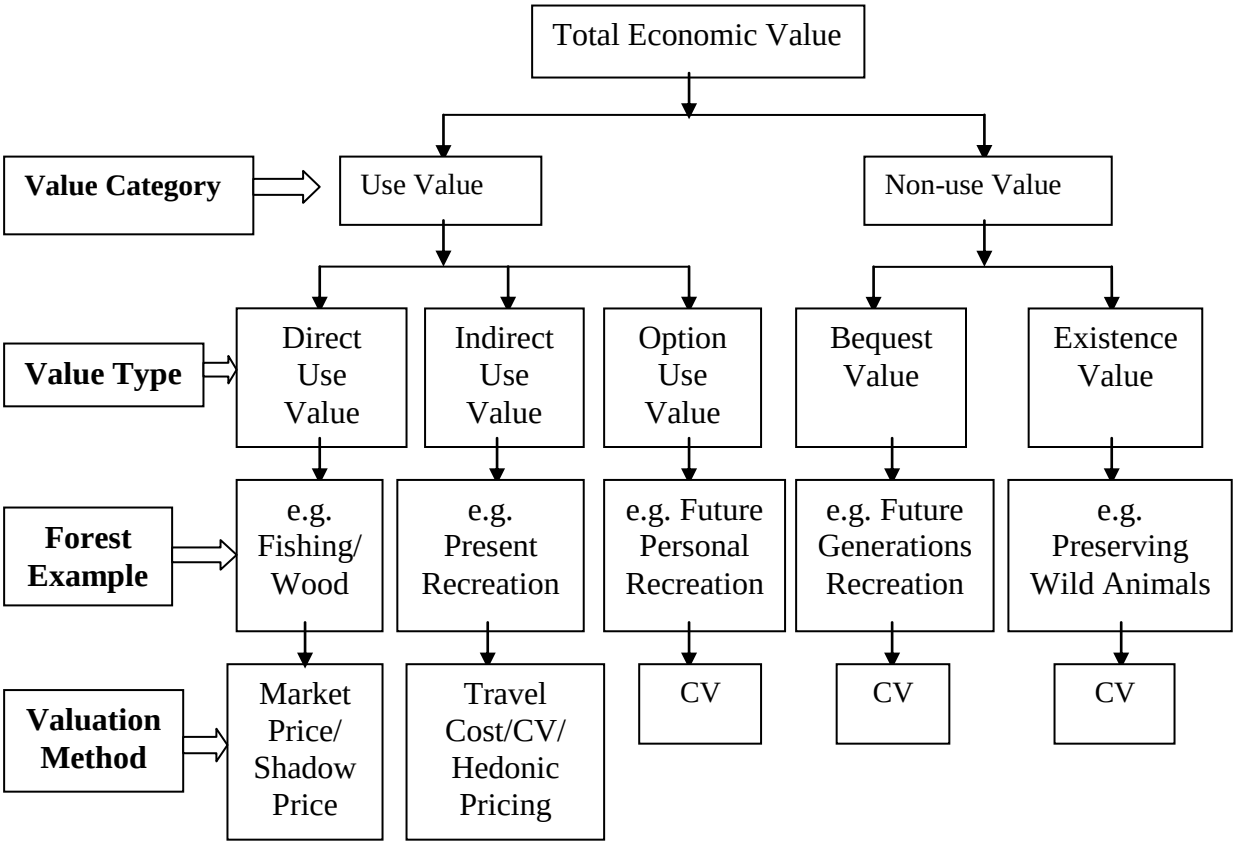
sanctuaries, as compared to the same conducted in foreign countries. Naturally this alone is a serious motivation behind the present undertaking especially in view of validity tests on CVM exercises that are carried out in this study. Secondly, tourism around Kaziranga National Park depends purely on the visitor's excursion to the park. Socio-economic characteristics of the visitors and distance of the park from their homes affect their travel decisions to KNP. To sustain the eco-tourism of KNP, it is very important to know how these variables affect their trips to the park and in this study this type of analysis is also carried out. Thirdly, one horned Indian rhinoceros are found only in Assam and many of the visitors from far places visit KNP only for viewing this exceptional wild animal. It thus has a great influence on the economic value of the park. But poaching of this wild animal is going on endlessly in the park without much control by the security. Accordingly, the importance of one horned Indian rhinoceros in the economic value of the park is estimated in economic terms.

1.7 Conceptual Framework

1.7.1 Types of Value: Economists have decomposed the total economic value of the environmental resources into three main components: (1) use value, (2) option value and (3) non-use value. This is shown in Figure 1.2. Use value reflects the value that people place on the direct use of the environmental resources. Option value reflects the willingness to preserve an environmental resource which will be used in the future even if one is not currently using it or the desire to preserve a potential for possible future use. And lastly the non-use value reflects the common observation that people are more

willing to pay for improving or preserving resources that they will never use. Non-use values are derived from motivations other than personal use.

Figure 1.2 Total Economic Value of a Forest



The non-use value captures the existence value and bequest value of the environmental resources or services. The bequest value (BV) originates when people are willing to pay to conserve a resource for the use by future generations. Existence value (EV) is a concept associated with peoples' willingness to pay simply for the pleasure they derive from knowing that a heritage site, or natural area or particular specie or characteristic exists, irrespective of any plans of actually using these resources. These categories of

value can be combined to produce the total economic value (TEV) which is conceptually the total willingness to pay (TWP):

TWP (or TEV) = Use Value + Option Value + Non-use Value

1.7.2 Economic Valuation of Environmental Resources: Environment is the combination of all social, economical, biological, physical and chemical components of the globe which creates the surroundings of man. Human life is affected by nature in a variety of ways. It provides all its usual necessities for human survival such as air, food, water, energy, etc. These necessities are most vital for survival of mankind. It is also the reservoir of all wastes that are created by human activities like production, consumption, etc. and further by natural activities. Human beings have depended on the environment for survival for over thousands of years, but their activities did not affect the environment adversely during ancient times as because population was sparse and technology was primitive. Mass scale resource exploitation was neither possible nor necessary. Carbon emissions began rising ever since fire was discovered by man. When the development process got momentum in the west with the dawn of the industrial and scientific revolution, mass scale environmental resource exploitation and consequent mechanized transformation into products began for the sake of human consumption and comfort. Betterment of standards of living with the help of science and technology is a more primitive concept compared to the more sophisticated concept of welfare. But irrespective of the requirements of creature comfort or human welfare, exploitation of natural resources along with pollution and waste generation due to production for human consumption has adversely affected the environment over the past five decades.

The Second World War single handedly raised global pollution standards by leaps and bounds.

Barring a few African countries each and every economy of the world has progressed tremendously in the path of development during the last three to four decades and obviously GDP (Gross Domestic Product) of these economies has increased many folds. The traditional method of National Income accounting system is used to estimate GDP of these economies which include only contributions of the factors of production like labour, capital, etc. However this traditional system of GDP measurement does not include exploitation and destruction of the environmental resources and services that are quite natural when an economy is striving for a rapid rate of industrialization and GDP growth. The concept of sustainable development is not at all incorporated in traditional methods of GDP estimation. So the traditional methodology for GDP estimation does not incorporate the path of sustainable development and does not ensure the increase in welfare of the people in the true sense. Various researches have been carried out to remove this drawback of the traditional system of National Income Accounting in the recent years keeping in view the numerous benefits of the environment in increasing welfare of the people.

These works conclude that proper protection and conservation of the environment is must for uplifting welfare of the common masses. So the environmental resources and services like forests, wildlife, water, minerals, and other forms of flora and fauna are also a part of national capital stock, as because these natural capitals contribute towards the welfare of an economy. Their uses in production and consumption purposes increase

welfare of the common people and over exploitation and abuse/plundering reduce it. Therefore the value of these resources should also be included in the framework of National Income accounting system. Otherwise it gives an either overestimated or underestimated GDP of an economy.

Hence economic valuation of the environmental resources and services is very much essential. In order to include the value of these resources in National Income of an economy, first and foremost it is necessary to estimate the value of these resources by means of some appropriate economic methodology. During 1950s nonmarket valuation methods first came into existence and since then the conceptual possibility of quantifying the economic values of those goods and services which are not priced by the market started gaining popularity. These goods and services are generally environmental resources and amenities (benefits).

1.7.3 Market Failure: A market is an exchange institution, in which economic activities are organized and performed to serve the society. Price of a commodity or good in a market is an instrument to communicate the wants and limits of a diffuse and diverse society so as to bring about efficient and coordinated economic decisions. Perfect functioning of a market mainly depends on two conditions as follows:

(1) It’s decentralized process of decision making and exchange,

(2) No omnipotent central planner is needed to allocate resources.

Prices of the resources rationalized their uses and in doing so, individuals are swept along by Adam Smith's invisible hand to achieve the best collective situation or condition for the society.

But market fails for environmental resources. Prices often underestimate the full range of services provided by an asset or do not correctly anticipate value of the asset. Market failure occurs when private decisions based on these prices, or lack of them, does not generate an efficient allocation of resources. Inefficiency implies that better situations can be achieved by reallocating the resources. A wedge is driven between what individuals want privately and what society wants as a collective.

An important condition to avoid market failure is that markets are complete, means large markets exist to cover each and every possible transaction or contingency so that resources can move to their highest valued use. Markets will be complete when traders costlessly create a well-defined property rights system such that a market will exist to cover any necessary exchange. This well-defined property rights system represents a set of entitlements that define the owner's privileges and obligations for use of a resource or asset. Markets are incomplete because of the failure or inability of institutions to establish well-defined property rights. For example, there is no legal or institutional basis that allows the downstream users of polluted river water to receive compensation from upstream farmers whose sediments, pesticides or fertilizers increase downstream costs in the form of contaminated drinking water, poor declining fish stock or reduced recreational opportunities. This inability or unwillingness to assign property rights has

provided the rationale for the Government to intervene as an advocate of proper management of environmental resources.

Environmental resources or services have mainly three characteristics and due to these features market fails in optimal pricing and allocation of these resources. The characteristics are as follows:

(1) Externalities

(2) Non-excludability, and

(3) Non-rivalry

(1) **Externalities:** The externality is the classic special case of incomplete markets for an environmental asset (Arrow, 1969). If the consumption (or production) of one individual (or firm) affect another person's utility (or output in case of firm) so that the conditions of Pareto optimal resource allocation are violated, then an externality exists. The set of markets is incomplete in that there is no exchange institution where the person pays for the external benefits or pays a price for causing the external costs. Suppose an individual's utility function is given by U(x,y) where x and y are quantities of two goods (or bads) consumed. The individual chooses how much of x to consume but has no control over consumption of y. How much y will be consumed is chosen by others and this is an externality. Generally three types of externalities exist – production externality, consumption externality and pecuniary externality.

A production externality exists when one firm's profits are involuntarily affected by another's. Suppose the technology of producing laundry is given by

$$L = f_L(x_1, \ldots\ldots\ldots\ldots, x_n, e) \quad \ldots\ldots\ldots\ldots\ldots\ldots (1.2)$$

where L is output of laundry and $x_1, \ldots\ldots\ldots, x_n$ are n different inputs into laundry production. The variable e is smoke emissions from steel manufacturing, which is of course chosen by a steel mill. The steel mill produces steel (S) and smoke emissions (e) are the inputs $z_1, \ldots\ldots, z_m$ of the steel industry, according to

$$S = f_s(z_1, \ldots\ldots\ldots\ldots, z_m) \quad \ldots\ldots\ldots\ldots\ldots\ldots (1.3)$$

$$e = f_e(z_1, \ldots\ldots\ldots\ldots, z_m) \quad \ldots\ldots\ldots\ldots\ldots\ldots (1.4)$$

Here e is chosen by the steel mill [Eq. (1.4)], but e enters into the production function of the laundry [Eq. (1.2)]. The laundry has no control over what the level of e is or how e enters its production function. Thus the smoke is an externality.

A consumption externality exists when one individual's utilities are involuntarily affected by another's. It is almost similar to the production externality. The difference is that it deals with utility function instead of production functions.

A pecuniary externality occurs when one person's actions affect the prices paid by another person. Suppose a person has eaten swordfish for many years. Recently he observes that the price of swordfish has risen dramatically due to the increasing popularity of fish, sword fish being a healthy diet and due to rapid depletion of

swordfish stocks. The actions of others have driven up the price of fish so that now the person has to pay more to consume it and as a result he consumes less. This is an example of pecuniary externality. Since prices do not enter into utility or production functions, this is not a conventional externality and in fact does not involve inefficiency.

(2) **Non-excludability:** Another situation where the market may fail to allocate resources efficiently is when it is impossible or at least very costly to exclude someone in assessing an environmental asset. Environmental resources are consumed equally by all. For example, a national park accrues benefit to the whole society, to all visitors and all are equally benefited. Therefore the environmental resources cannot be supplied by the market system. The exclusion principle on which the market system is based is inapplicable in case of these resources. In the private market, if a person is not ready to pay a price for a commodity, he will be excluded from the consumption of that commodity. This is called as “exclusion principle”. This principle solves the problem of distribution of goods in the private market. If there is scarcity of supply, the limited amount will go to the highest bidder with the exclusion of those who do not pay the relevant prices. Since these resources cannot be sold through the market and have to be supplied free or at zero cost, so no one can be excluded from the consumption of these resources.

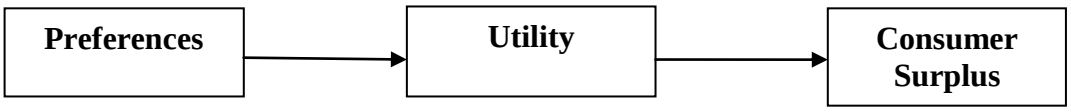
(3) **Non-rivalry:** Inapplicability of exclusion principle follows that environmental resources are non-rival in nature because its consumption by one individual does not reduce its availability to other individuals, but private goods are rival in consumption. This is also obvious from the fact that these resources are consumed in equal amount by

all. Non-rival consumption means absence of competitiveness in consumption. Environmental resources are not competitive in consumption. The amount of benefits from a nation park are equally available to every individual, the consumption by any one will not reduce the consumption share of any other individual. For this characteristic of these resources, market also fails.

1.7.4 Nonmarket Valuation Methods: Environmental resources supply a flow of direct and indirect services to society. But while these resources provide a nearly limitless set of valuable attributes, many of their services remain un-priced by the market. The services are rarely bought and sold in the market. Based on the foundation of rational choice, individuals are assumed to be able to value the changes in environmental services despite their absence from the market. If a change occurs such that the person believes he/she is better off in some way and may be willing to pay money to secure this improvement. This willingness to pay reflects his/her economic valuation of improved environmental services. Alternatively, if the change makes her worse off, she might be willing to accept compensation to allow this deterioration. This willingness to pay (WTP) and willingness to accept (WTA) represent the two general measures of economic value for an environmental service. These measures of value are what economists would like to estimate so that environmental services and other non-market goods can be included in policy decisions on how to prioritize and allocate public funds. For that purpose the non-market valuation methods are used to estimate the economic value of these non-marketed goods and services.

Economists' thinking regarding valuation of non-market goods are shown in Figure 1.3. It demonstrates the three logical constructs that are used to derive a theory of economic value based on rational choices and the three constructs are as follows: the preference set, utility function and consumer surplus. An individual is assumed to have a set of preferences over goods and services which are ordered in a logical and consistent manner. The preference ordering restricts how an individual chooses between different consumption bundles. Axiomatic restrictions are usually imposed to define a consistent preference ordering and guarantee the existence of a utility function that serves as an index for the preference ordering.

Figure 1.3 Interlinkages among Preferences, Utility and Consumer Surplus



The utility function is an ordinal presentation of preferences, which express the most preferred consumption bundles by the highest level of utility. Utility is an unobservable, continuous index of preferences. If a policy is imposed in the economy which changes the consumption bundle of the individual and increases utility level, then economists measure this change as consumer surplus – the money metric of the unobservable utility function. Consumer surplus can be either a willingness to pay or a willingness to accept compensation measure. So it can be concluded that individuals have preferences that are indexed by a utility function and changes in utility are captured by consumer surplus measures. With the appropriate restrictions, an individual's willingness to pay for a

change in environmental quality is based on the theory of rational choices and is therefore a consistent estimate of preferences.

Valuation methods follow two major approaches – *direct methods* and *indirect methods*. Direct methods seek to infer about individual's preferences for environmental quality directly, by asking them to state their preferences for an environmental benefit (good or service). The Contingent Valuation method is an example of direct valuation methods. In contingent valuation surveys, for example, this might consist of asking people for either their maximum willingness to pay (WTP) for an increase (improvement) in environmental quality or their minimum willingness to accept compensation (WTAC) to forgo such an increase in environmental degradation or pollution.

Indirect methods of valuation seek to measure the estimates of individuals' willingness to pay for environmental quality by observing their behavior in related markets and individuals preferences are revealed through purchases of market-priced allied goods. It is an alternative to contingent valuation method. The travel cost model is one of the examples of indirect approaches to environmental valuation. With the help of travel cost method consumer surplus can be estimated.

Chapter 2

2.1 Introduction

Since early 1970s policy makers in developed countries have recognized the importance of environmental resources and benefits and their economic valuation while framing development policies with regard to their own economies. The primary focus of developed countries has long been on sustainable development, i.e. a development strategy that meets the needs of the present without compromising the ability of future generations to meet their own needs. Their challenge on this account is relatively small as compared to their developing counterparts simply because of their low population growth (also low density in many cases – USA, Canada, Australia and Scandinavian nations for instance) natural resource abundance, and possession of low carbon emitting efficient technology. Focus has long been on Contingent Valuation Methods (CVM) and its variants whereby, the willingness to pay and to protect an environmental resource and its socioeconomic determinants have been look at.

It must be understood that the preservation of environmental resources (or assets) is much more difficult in developing or underdeveloped countries compared to their developed counterparts. Presently however, most poor or backward nations have focused on preservation of natural ecosystems that includes forest cover, inland water

bodies, wetlands, deserts and all other wild life habitats. Currently countries such as India, Sri Lanka, Nepal, Bhutan and Bangladesh are desperately trying to protect the natural ecosystems amidst enormous population pressures that are constantly encroaching upon the natural habitats of endangered species. Indigenous populations are often dependent on natural wildlife habitats for their own livelihoods and hence sustainable environmental policy making in these countries become an obviously complex exercise. Consequently economic valuation of environmental and natural resources is becoming more important day by day in the Third World.

As mentioned, valuation of environmental benefits and costs has long been recognized as

an important academic exercise in developed nations. More recently this has become a regular feature of environmental policy evaluation in developing countries such as in the countries of the subcontinent. However in comparison to such studies in developed countries, there is a dearth of research concentration on valuation of environmental resources in underdeveloped countries. As a result studies on valuation of these assets in the subcontinent are infrequent.

There are several methods to estimate recreational or even total economic value of environmental resources. In this chapter various studies conducted in different parts of the world have been reviewed and found that travel cost method (TCM) and contingent valuation method (CVM) are most widely used methods to estimate the economic value of these natural and environmental assets across the world. As an obvious consequence

both TCM and CVM are used to estimate the recreational or economic value of Kaziranga National Park (KNP) in the present study.

From these reviewed published works it may be concluded that people of developing countries also place values on environmental goods and services and the valuation methods used in the developed countries may also be suitably applied to developing countries. According to the World Bank Environment Assessment Sourcebook Update (1999), even though the developing countries have budget constraints, the government should spend on environmentally-oriented economic analysis. The World Bank had listed some suggestions of "best practice" for integrating natural resource and environmental issues into economic analyses of projects and policies. The methods and approaches that are applicable to the developing countries are categorized into three classes or types: market-based methods, methods based on surrogate market values, and methods based on potential expenditures or willingness-to-pay. Examples of market-based methods are the change-in-productivity approach and the loss-of-earnings approach. Methods based on the surrogate market values include the property value approach, the wage differential approach, and the travel cost approach. Approaches under the methods based on potential expenditures or willingness-to-pay are the replacement cost approach, shadow projects approach, and the contingent valuation method. The implication is that the World Bank is strongly encouraging developing countries to start to internalize environmental benefits and costs measured in money terms and to incorporate these values in decisions regarding government's projects and policies.

By reviewing these works or researches it is possible to get profound idea of what others have done in the same area. In other words the review helps in developing the theoretical and methodological issues related to the present study. It further helps in finding out the research gaps or limitations of the previous studies. Attempts are made to remove these limitations or research gaps in order to avoid mechanical replication of past researches in this field.

As mentioned already, the majority of the valuation works of environmental resources, services and benefits have been done in foreign countries and only a handful of such studies have been conducted in India. The reviewed literature on non-market valuation methods that are related to the study, are categorized into two groups:

(a) Studies conducted in Foreign Countries

(b) Studies conducted in India

2.1.1 Studies conducted in Foreign Countries

Since 1970s a large number studies have been devoted to developing the literature on non-market valuation methods and its applications in various fields of environmental economic studies in developed countries, especially in valuing environmental goods and services besides environmental damages and costs (hazards).

Smith (1975) has conducted a study on the suitability of the conventional models utilized in travel cost demand estimation for estimating the demand for wilderness recreation of the Desolation Wilderness Area of California on the basis of 1972's

visitation experience data. Three models (linear, semi log and log-linear) were used for the estimation part. With conventional criteria, both semi log and log-linear specifications yielded completely acceptable results. Since the implications of each form were quite different for the measured demand structure, the selection of either of the two models may have important policy implications. To discriminate between the models, the Cox-likelihood ratio test was applied to them and the results of the test indicated that neither model provided a reasonable representation of the behavioral patterns described by the data.

Cesario (1976) conducted a study on the value of time for the recreationist when they value an outdoor recreation site. With the outdoor recreation data pertaining to a site of parks in the north-eastern United States under three different assumptions: (i) ignoring travel time, (ii) using the ad hoc methodology of Cesario and Knetsch (It is a modified model of Hotelling-Clawson-Knetsch (HCK) approach in which a linear trade off functions lies between money and time, (iii) there exists a multiplicative form of relationship between money and time. It is seen that the benefit estimates obtained by explicitly considering travel time substantially exceed estimates made when travel time is ignored. And, the proposed method produced estimates which are substantially lower than those produced by the ad hoc method of Cesario and Knetsch. The reason for the discrepancy lies in the difference in the trade off functions in money and time implicitly considered. They conclude that explicitly incorporating travel time valuations in recreation benefit analysis seems vastly superior to excluding them on both theoretical and practical grounds.

Menz and Wilton (1983) discussed about an alternative to the travel cost method for estimating the economic value of the St. Lawrence River-eastern Lake Ontario bass fishery of New York and three different methods are used for this purpose. Method I-a and I-b derive benefits as the area under the aggregate demand curve and method II derive benefits as the sum of the areas under the individual origin-site demand curves. From the results of the case study depicts that the method II (i.e., the alternative way) would estimate the net economic value more accurately than the other methods considered here, if the participation equation is the true demand equation. So it is important not only in specifying the participation prediction equation but also in the procedure for calculating an outdoor recreation resource's net economic value.

Dwyer, Peterson & Darragh (1983) have used the travel cost method to estimate the willingness to pay for visiting three sites in the Chicago metropolitan area; Morton Arboretum, Lincoln Park Conservatory, and Garfield Park Conservatory. Use of a travel cost model to estimate the willingness of users to pay for visits to urban forest sites has demonstrated that these sites provide substantial values to users. Ignoring these values is likely to lead to inadequate and inappropriate expenditures on urban forest resource management. When funds are scarce, information from travel cost models can provide valuable guidance for urban forest management. It is found that average willingness of to pay for a visit Lincoln Park Conservatory, Garfield Park Conservatory and Morton Arboretum is to be $12.71, $ 8.68 and $ 4.54 respectively. The estimated willingness of users to pay for a visit to Lincoln Park Conservatory is higher than the other two parks

because there are a cluster of attractions that include a zoo, a large park, and the shore of Lake Michigan.

Rosenthal (1987) has conducted a study on the importance of substitute sites prices in the recreational demand analysis. Generally travel cost method is used for recreational demand and many empirical estimates of demand for recreation sites using TCM have ignored the price of substitute recreation sites. The purpose of this paper is to determine effects of the price of substitute recreation sites on consumer surplus estimates of the TCM. Data from eleven reservoirs operated by the US Army Corps of Engineers in Kansas and Missouri were used to estimate the bias caused by omitting substitute prices from the TCM demand curve and were collected by on-site interviews at each of the eleven reservoirs during the summer of 1982. Three separate types of TCMs were developed from a common data base representing 60,000 day-users of the eleven reservoirs. The author constructed the first set of TCM models omitting prices of substitute sites and in the last two sets these prices were included (the second model is a traditional TCM with substitute prices and the third model is a discrete choice TCM specified as a gravity/logit model). The average consumer surplus per person per trip was 7.1 for the 1^{st} model and 2.81 and 4.04 for the 2^{nd} and 3^{rd} model specification respectively. The author also conducted an analysis of variance test showed that consumer surplus estimates from the first set of models were significantly higher than the other two ($F=26.2$ with 2, 20 degrees of freedom). From this article the author concluded that omitting substitute sites prices from a travel cost model caused a significant bias in consumer surplus estimates.

Bockstael, Strand and Hanemann (1987) have put forward a theoretically consistent approach in which time costs also includes in the recreational demand models. This theoretical approach is used to estimate the parameters of the recreational demand model for a group of Southern California sport fishermen who fished during 1983. Both travel time and on-site time are considered as scarce resource and must appear in time constraint to be properly accounted for by the model. The exclusion of either will give us bias results. The recreational commodity is defined in terms of fixed units of on-site time and it is assumed that travel does not in itself influence utility levels. The demand model is conditional on the recreationalist's labour market situation. For individuals at corner solutions in the labour market, utility maximization is subject to two constraints, leading to a demand function with travel costs and travel time as independent variables. With interior solutions in the labour market, time is valued at the wage rate and combined with travel costs to produce one "full cost" variable.

Bowker and Stoll (1988) estimated the individuals' economic surplus associated with preservation of the whooping crane resource (Grus Americana), an endangered species, by using dichotomous choice of contingent valuation method. The authors also put forward a methodology to estimate the non consumptive benefits associated with the existence of this endangered species. The authors used three specifications for both Logit and Probit models. The survey was conducted in the winter/spring of 1983 to (a) users of the Aransas National Wildlife Refuge and (b) nonusers of the refuge, including Texas residents and residents of Los Angeles, Chicago, Atlanta and New York standard metropolitan areas. The mail and on-site surveys were carefully designed, on-site

questionnaire was given to 800 visitors at the refuge and 1200 were mailed to Texas residents and 600 questionnaires were divided among the four large standard metropolitan statistical areas. The authors got an annual estimate of willingness to pay could fall within the $5 to $149 range (excluding the negative medians) depending upon which estimation approach was chosen. It revealed that models with fairly similar statistically fits can lead to very disparate measures of economic value, regardless of whether the mean or median is chosen to estimate average willingness to pay.

Loomis (1989) has conducted a study on reliability of the contingent valuation method by the test-retest procedure. With the help of CVM, the willingness to pay or willingness to accept compensation is measured for an environmental resource, but sometimes these estimates are overestimated or underestimated because it is estimated in a hypothetical market scenario. For that reason it is necessary to access reliability of the estimate of CVM. In this study the author used two target populations and they were surveyed. The first was a sample of California households drawn from the general population. The second was a sample of Mono Lake visitors, contacted on site. The mailing procedure is used for both surveys. Mono Lake is situated just east of the Sierra Nevada Mountains in California. To test the reliability of the estimate of the CVM, the author was resurveying the same general households and visitors after nine months of their original survey. The author found that the test-retest correlations on WTP are statistically significant and ranged from 0.422 (for the general population sample) to 0.782 (for the visitor sample). The author used a paired T-test and found that there was no statistical difference between an individuals' first and second reported WTP. The

author also used the Chow test and found no statistical difference (at 1% level of significance) between the original and resurvey WTP functions and concluded that WTP is reasonably stable over the time period surveyed.

Cook and Cable (1990) measured the economic value of windbreaks for hunting in the state of Kansas using contingent valuation method. A windbreak is a row or rows of trees planted adjacent to a field to break the force of wind. It also reduces soil erosion, protect crops and livestock and provide other agricultural benefits. Kansas is known for its excellent hunting opportunities, but Kansas and other Great Plains states are in danger of losing these opportunities because of the deterioration and removal of windbreaks. The population for this study was the 124,518 hunters who purchased a Kansas resident hunting license in 1986. They randomly selected 1,501 samples for the study and mail survey was used for the purpose. The net economic value for windbreak hunting in Kansas was $21.5 million per year and local economies also benefit when hunters spend money on their trips to windbreaks. Decreases in the quantity and quality of hunting opportunities might cause hunters to take fewer trips or dropout of hunting entirely.

Dixon and Sherman (1991) demonstrate how the valuation process of Khao Yai National Park of Thailand, Kenya Game Park and an Amazonian Rainforest be improved and identified the major costs and benefits of these protected areas. It is so important to maintain the natural resources and the biodiversity. The total amount of area given protected status is frequently less than desirable and the level of funding provided for management is almost always inadequate to do the job. A major reason for

this is that the benefits to society from protected are often grossly underestimated and the immediate costs of protection appear large in comparison. The market system cannot reflect all aspects of the protected areas and for this reason the government investment is required to maintain the biodiversity of the protected areas. With the help of economics it is possible to explain why benefits are underestimated and how benefit estimation can be improved with the help of various methods such as benefit-cost analysis (BCA) and safe minimum standard (SMS) approaches. This information can be used to justify increasing the extent of protected areas and providing larger budgets for management.

Eberle and Hayden (1991) discussed about the weakness of contingent valuation method and travel cost method for valuing natural resources and ecosystems applying the principles of general systems analysis (GSA). The TCM and CVM are usually specified as a Marshallian demand function and Hicksian demand function respectively. All attributes of non market goods cannot be captured by the market price, therefore using of Hicksian and Marshallian demand functions for the non-market goods create many complications to identifying consumer preferences. The CVM and TCM methodologies are inconsistent with GSA and are not an attempt to define or evaluate a system. GSA principles will be defined and used as standards by which to judge adequacy of the CV and TC methodologies and mentioned that for some context any methodology is adequate.

Regens (1991) has demonstrated the environmental benefits of Norway's Kristiansand Fjord with the help of Contingent Valuation Method. Kristiansand Fjord, located on the

southeastern coast, is one of a number of areas along the Norwegian coast that are heavily polluted. It receives wastewater inputs especially organic pollutants, from a variety of sources, including industrial plants and households. In order to estimate the benefits of remedial action to cleanup Kristiansand Fjord, a national survey was conducted using a random sample of the Norwegian public and collected 659 samples. Personal interviews were conducted by the Norwegian Gallup Institute in early 1986. The author used the iterative bidding technique to elicit individuals' willingness to pay. The dependent variable is continuous rather than discrete, for this reason the OLS (ordinary least squares) is employed to estimate WTP. The Norwegian public was willing to pay, on average, approximately 963.3 million NOK. The author also discussed about the survey instrument and various techniques used to control for biasing. Thus, it provides insights into the feasibility of measuring directly the benefits of environmental management policies.

Rockel and Kealy (1991) have estimated the value of non consumptive wildlife recreation in the United States. The authors estimated the probability of participation and number of hour's people observes photography and feed wildlife away from the home conditional on participation with the help of travel cost method. The data used for estimation are from the 1980's National Survey of Fishing, Hunting and Wildlife Associated Recreation (USFWS1982). Firstly, the sampling design is conducted by the telephone screening survey of 120,000 US households according to US bureau of the Census, and secondly, then follow up, personal interview was taken of 6,000 participants in non-consumptive wildlife recreation activity. The authors used the Probit

model to estimate the probability of taking participation in non-consumptive wildlife recreation and used Heckman Linear model, Heckman Semi-log model and Cragg Semi-log model in estimating the welfare effects of non-consumptive uses of wildlife. The authors treated a non consumptive user hour as a generic commodity which helps in formulate a one-equation pooled travel cost model for estimating the demand for visitor's hours at each of the locations. Using linear model, found an average annual WTP for access to non consumptive wildlife recreation is $3,731 per observation, but for the semi-log specification the estimate is $198. This difference in estimates due to difference in the functional form of the estimation method, assumptions about the source of error or the value of time, or using Marshallian versus Hicksian welfare measures. Aggregating across all users, the total WTP for the linear specification is $164.5 billion but for the semi-log specification the figure is $8.7 billion. These estimates for the total net value of non-consumptive recreation are an underestimate because the loss of access to each site was calculated assuming the existence of all other sites.

Cameron (1992) estimated the value of recreational fishing opportunities of US by combining the contingent valuation and travel cost data to estimate jointly both the parameters of the utility function and its corresponding ordinary demand function. CVM or TCM have been used separately before to estimate the economic value of environmental resources. The author developed a new conceptual framework and put forward a new joint model which forms a prototype approach for a whole spectrum of non-market resource valuation tasks. The in-person survey of recreational fishermen

was conducted from the Mexican border to the Louisiana state line between May and November of 1987. This conceptual innovation requires cooperation of CVM and TCM data in the production of a single set of value estimates. In this conceptual framework travel cost data capture current behavior while the CVM information providing insights into probable behavior of the respondents under conditions which are considerably removed from the existing market scenario. The basic model mentioned here uses a quadratic direct utility specification. This form is used because its simplicity and because feasible variants of a number of other familiar specifications are unsuitable for the derivation of tractable ordinary demand functions. The author used the equivalent variation to measure the total economic value and found that economic value of the recreational fisheries were $3,423. The author concluded that this utility theoretic framework can be used to combine the two types of information (CVM and TCM) and produce a single joint model to produce what should be a more comprehensive picture of preferences that would be available from either information source used separately. This approach may be particularly useful for tying the stated preferences of non-users to the revealed preferences of users in any effort to establish defensible measures of non-use demand (i.e. – existence and option demands).

McConnell (1992) has discussed about the time spends in the enjoyment of the recreational activity at a site. The author explained the methodology with an example of beach demand in New Bedford of MA. If someone is spending more time at a site it should enhance the value of the recreational activity, but it increases the costs also. So, the dual role on-site time – a determinant of the quality of the trip and a cost of the trip

– creates a problem in recreational demand estimation. Most of the travel cost studies neglected the issue of onsite time for several reasons and took it as an exogenously determined variable. It demonstrates a simple and neat solution to the problem of onsite time when it is endogenous. With slight modification of the standard travel cost demand function it is possible to estimate the welfare functions continue to hold.

Navrud and Mungatana (1994) estimated willingness to pay for preservation of the Lake Nakuru National Park in Kenya. Ecotourism tries to capture the willingness to pay for preserving wildlife as expressed by those who embark on safaris to view wildlife in their native habitat and uses that revenue to support reservation activities. Originally Lake Nakuru established as a bird sanctuary in 1961, this park was expanded in 1969 and in 1972. It is the home of some 1.4 million flamingos as well as some 360 other species of birds. The number of flamingos has diminished due to water pollution from increased farming activities. Using travel cost and contingent valuation methods, the authors calculated use value of visits to the park to view wildlife. The travel cost estimates indicated that the annual value of recreational viewing in this park in 1991 was ($US) 13.7 to 15.1 million. Of that, ($US) 3.6 to 4.5 million was from residents of Kenya; the rest (the majority) was from non-residents. The total value estimated by contingent valuation was ($US) 7.5 million.

Carson, Flores, Martin and Wright (1996) have carried out a meta-analysis that seeks to summarize the available information to provide the broadest possible overview of how contingent valuation (CV) estimates for quasi-public goods correspond with estimates obtained from revealed preference (RP) techniques. Through an extensive search of

both published and unpublished literature, the authors have located 83 studies that provide 616 comparisons of contingent valuation to revealed preference estimates for a wide variety of quasi-public goods for almost thirty years, 1966-94. At first CV/RP is estimated and the CV/RP ratios treating the dataset in three different ways. The complete sample uses each individual CV/RP ratio as an observation." The trimmed sample uses the remaining data after trimming off the smallest 5 percent and largest 5 percent of the CV/RP ratios. The weighted sample uses the mean CV/RP ratio from each study as that study's observation. For the complete sample, the estimate of mean CV/RP ratio is 0.890 with a 95 percent confidence interval [0.813-0.9601 and a median ratio of 0.747. For the trimmed sample, the estimate of mean CV/RP ratio is 0.774 with a 95 percent confidence interval [0.736-0.8111 and a median of 0.747.13. For the weighted sample the mean CV/RP ratio is 0.922 with a 95 percent confidence interval [0.811-1.0341 and a median of 0.936. A non-parametric density estimate of the complete sample using a simple kernel density estimator first proposed by Wegrnan (1972) with a width parameter of 0.5 is also calculated and most of the density falls below a CV/RP of 2.0 with almost 70 percent of the mass to the left of a CV/RP ratio of 1.0. It has a fairly long, but very shallow, right tail because in some studies the CV/RP ratio ranges from 2.0 to 6.0. The authors categorized all the studies according to type of the goods which are valued and they are various forms of recreation (mostly outdoor), changes in health risks, and changes in environmental amenities such as air pollution, noise pollution, water pollution or parks. They are regressed the CV/RP ratios from the trimmed dataset on a set of dummy variables for the broad class of goods valued. They

suggest that the HEALTH goods may have CV/RP ratios closer to 1.0 relative to the other two categories of goods. The single-site travel cost models (TC1) produce higher CV/RP ratios on average than do the multiple-site models (TC2). This is largely because many TC1 models do not include any value for travel time while most TC2 models make some allowance for travel time costs. TC2 models also tend to be more elaborate with some visitors coming from long distances to one or more of the sites examined. Estimates from the TC2 models are often presented using different functional forms, some of which produce quite large RP numbers. The CV estimates vary with the treatment of outliers and protest responses, the functional form used with discrete choice CV data, and the payment mechanism used. CV estimates are undoubtedly sensitive to how well the good is described and whether the respondents believe the good can be provided (Mitchell and Carson 1989). Looking at the average CV/RP ratio does not directly address whether CV and RP estimates tend to move together. Even if the average CV/RP ratio is close to one, it is still possible for the correlation coefficient between the CV and RP estimates to be close to zero. The convergent validity of the two measurement techniques is closely tied to the presence of a significant correlation between the estimates derived using the different techniques, although how large such a correlation should be is an open question. A correlation framework in this case can also be linked to a measurement error model where neither of two available measurements is error free and the two techniques may measure the desired quantity in different units such as gallons and liters. We provide two measures of correlation, the Pearson correlation coefficient and the Spearman rank-order correlation coefficient. The Pearson

correlation coefficient is the ratio of covariance of the two measures to the square root of the product of the variances of the two measures. The Spearman correlation coefficient is a nonparametric measure which first individually ranks orders the values obtained from the two measurement approaches and then calculates the Pearson measure using the ranks as the data. For the complete sample, the Pearson coefficient is 0.83 and the Spearman coefficient is 0.78. For the trimmed sample, these two measures are 0.91 and 0.88, respectively, while for the weighted sample they are 0.98 and 0.92, respectively. Both of these datasets show higher correlation than the complete dataset since in the trimmed dataset, the most divergent observations have been dropped and in the weighted dataset. In all three datasets, both the Pearson and Spearman correlation coefficient are significantly different from zero ***(p*** < 0.001) and suggest that if the RP estimates are systematically varying with the nature of the good being valued, then so are the CV estimates.

Choe, Whittington and Lauria (1996) estimated the economic value that people in one urban area in a developing country (Davao, Philippines) place on improving the water quality of the rivers and sea near their community by CVM and TCM and then to reflect upon what these estimates may mean for this broader debate about the relationship between environmental protection and development. The authors selected 1,200 house-holds as sample from the general population of Davao using a two-stage stratified random sampling procedure and divided them into three different groups. The authors used Probit, Hazard Weibull and OLS model in dichotomous CVM technique and in TCM, OLS and Tobit models were used. The estimates of household willingness to pay

were almost similar obtained from the analyses of the CVM and TCM data. The WTP of households that used Times Beach from the Probit and Hazard models were 30 pesos (US $1.20) and 51 pesos (US $2.04) respectively. The loss of consumer surplus estimates of households that used Times Beach from the TCM were 51 and 36 pesos using Tobit and OLS models respectively (US $2.04; US $1.44). The people of Davao city were aware of environmental problems, but water pollution control is simply not a high priority for residents of the city, because there were more pressing environmental concerns in the city, such as deforestation and poor solid waste collection and disposal. This study also provided important and policy-relevant information for evaluating sanitation investments in developing countries.

McKean, Walsh and Johnson (1996) have demonstrated a travel cost demand study of the Blue Mesa reservoir of Colorado which included prices for closely related goods such as money and time costs of on-site time, on site purchases and other trip activities. To improve the estimates for the demand curve price elasticity and consumer surplus, it is important to include the variables measuring time spending and other activities which are conducted during the trip. They thought that to increase the accuracy of the value of a site it is necessary to more completely specified the TCM model and include the prices of the closely related goods in the model. They exclude those few persons from the sample who were most likely to be able to substitute work (i.e. earned income) for leisure time. They found that inclusion of prices for closely related goods should reduce under specification bias. The prices of the related goods (mainly complementary goods) consumed on the trips appear to have a major influence on trips per year. Estimated

consumer surplus per trip increased by over 50% when the closely related goods were added to the model specification.

Show, Chien and Lin (1999) evaluated of water quality of a Tamshui river system in the Taipei Metropolitan Area of Taiwan using the Contingent Valuation Method and the Travel Cost Method. The empirical estimation results show that the use value becomes much larger when the water quality improves to a higher level. In addition, the non-use value makes up a large share of the total value of improving water quality, thus the non-use value could crucial for examining projects aimed at improving the water quality in the Tamshui river system.

Sohngen, Lichtkoppler and Bielen (1998) explored the recreational value of single day trips to Maumee Bay and Headlands State Park beaches of Ohio's Lake Erie coastline using travel cost method. The survey was conducted randomly at the Maumee Bay and Headlands beaches during the summer of 1997. From the survey the authors found that the expenditures for single day trips are relatively modest, with an average of $21 per trip for Headlands and $34 per trip for Maumee Bay and the visitors of these beaches have higher income than in general population from which they were drawn. Because the data used in this analysis is truncated and censored, maximum likelihood techniques were used to allow for correction of bias caused by sampling methods. The data were collected only from the single day visitors who live within 150 miles of the beach. The authors explored two particular regression models, the model 1 does not include the prices of substitute sites and in the 2nd model the prices of substitute sites included. The results suggest that single day visitors took an average of 6 trips per year to Maumee

Bay State park beach and 7 trips per year to Headlands State Park beach and single day visits to Maumee Bay were worth $6.1 million and to Headlands were $3.5 million. But these values were overestimating the true value of recreation because this study do not fully account for the potential set substitute sites and recreational opportunities available. This study suggested that beaches were highly valuable public resources along Lake Erie's shoreline.

Chase, Lee, Schulze and Anderson (1998) have discussed on the application of a contingent behavior methodology to assess the effects of differential pricings for user fees on park visitation demand of Manuel Antonio (Beach Park), Poas and Irazu (Volcano Parks) national parks of Costa Rica. In developed countries, the user fees have a great role in the management of national parks and protected areas. But in developing countries it creates many problems in front of the policy makers to balance environmental and economic growth objectives because Government funds are typically in short supply and enforcement of environmental regulations lax or nonexistent. Many of the visitors to protected areas, such as national parks, are foreign tourists who incur few of the costs but enjoy many of the benefits stemming from resource conservation efforts. It presents a theoretical framework for estimating price and income elasticities of ecotourism demand. In order to measure the sensitivity of visitation demand to changes in park entrance fees and income levels, the authors estimated the unconstrained own-price, cross-price and income elasticities of demand using Probit and Tobit models. Own price elasticities of park demand are negative in all cases due to the inverse relationship between entrance fees (price) and visitation demand (quantity).

They range from highly elastic (Poas) to nearly unit elastic (Manuel Antonio). Cross price elasticities are positive and significant for the volcano parks only, indicating their clear (and inelastic) substitute relationship. Entrance fee changes at the volcano parks have no significant influences on visitation at the beach park and vice versa. The park demand visitation is significantly income inelastic in the case of Irazu and Manuel Antonio. The total park revenues are estimated to increase sharply, by $1.04 million (67.9), well above estimated annualized revenues under the policy existing in 1994-95. A differential pricing approach to entrance fee structures would enable park officials to take advantage of visitors' varying demand elasticities by charging fees appropriate to specific demands for park attractions and amenities. Park visitation objectives and revenue generation goals could thus be jointly achieved. Differential pricing using revenue-maximizing fees would, for example, slightly increase visitation at the most heavily visited volcano park (Poas) and substantially increase visitation at the less commonly visited park (Irazu). Charging differential fees can effectively "push" tourists from one park to another, which may be desirable as part of a park management strategy to solve over-crowding at one park or to encourage local economic development at another.

Rosenberger & Loomis (1999) measured the value of ranchland to tourists visiting a resort town in the Rocky Mountains of Colorado through a travel cost model that combines information on observed behavior data from actual trips with contingent behavior data on intended current visitation if the resources were converted to urban and resort uses. The value of ranch open space to tourists is the gain or loss in consumer

surplus derived from a visit to the study area attributable to the resource. In this study stratified random sampling technique is used to collect data from 403 tourists. A Poisson regression model is estimated because of the panel nature of the data, accounting for the correlation of the multiple responses from heterogeneous individuals. Twenty-five percent of the sample would reduce visitation and twenty three percent of the sample would increase visitation if ranch open space were converted to urban and resort uses. It was found that there is no net effect from not converting the existing ranchland to urban and resort development uses, i.e., the amount of increased visitation levels for people who are positively affected by the conversion of the resource to resort uses is equal to the amount of decreased visitation levels by people who would be negatively affected by the loss of valley ranchland.

Turpie and Joubert (2001) conducted a study on application of the existing valuation techniques to rivers, and to develop a methodology for estimating the economic impacts of a change in river quality. Rivers within the Kruger National Park (KNP) is affected by water usage in the portions of Crocodile catchment areas of the park boundary. The current tourism value of these rivers was considered in terms of revenues to KNP (visitors' on-site expenditure), contribution to the economy (visitors' on-site and off-site expenditure) and recreational value, including consumers' surplus. The effect of a change in river quality was determined using a joint contingent valuation - conjoint valuation approach, whereby respondents rated four different scenarios, each containing four attributes at four different levels. It was estimated that the current value of KNP tourism is about R 136 m. in terms of on-site expenditure, R 267 m. in terms of

economic impact, or all expenditure related to visiting the park, and R 1 bn. in terms of consumers' surplus. The latter two values can be added to calculate total recreational value. Four methods were used to isolate the value of rivers from the total tourism value and all yielded similar values of about 30% of the total. This implies that about 30% of tourism business would be lost if rivers were totally degraded. The conjoint analysis generated an equation which is able to predict the change in trip expenditure, or total KNP revenue, associated with changes in levels of any of the four attributes considered. Appearance of the rivers cape has the greatest influence on recreational use value, followed by water bird diversity, aquatic mega fauna and riparian tree density.

Giraud, Loomis and Cooper (2001) compared the estimates of various types of willingness to pay techniques from referendum style questions. This referendum method may be problematic for many reasons, including the statistical techniques used to estimate willingness to pay from discrete responses. The authors compared a number of parametric, semi-nonparametric and nonparametric estimation techniques using data collected from US households regarding Federal protection of endangered fish species and shows that using the jackknife approach WTP estimates are not significantly different between various parametric and semi-nonparametric modeling techniques with the exception of Turnbull technique estimates. This is mainly because Turnbull estimation technique does not allow for negative WTP amounts, but the others allow. A hypothesis test for statistical equality among estimation techniques is performed using a jackknife bootstrapping method. When the equality test is applied, modeling techniques do show significant differences in some possible comparisons, but only those that are

non-parametric and give conflicting interpretations of what the data show. Resource managers and policy analysts need to use caution when interpreting results until an industry standard can be developed for estimating willingness to pay from closed ended questions.

Carson, Flores and Meade (2001) have discussed about various aspects of contingent valuation methods and controversies regarding its application in valuation of environmental resources. CV is one of the most widely used non-market valuation techniques, which is used to estimate monetary value of environmental resources and amenities. CV's prominence is due to its flexibility and ability to estimate total value, which includes passive use value. Its use and inclusion of passive use value in benefit-cost analyses and environmental litigation is a subject of contentious debate. They discusses key areas of the debate over CV and validity of passive use value and concludes that many of alleged problems with CV can be resolved by careful study design and implementation. Authors also claims that empirical CV findings are theoretically inconsistent are not generally supported by the literature. The debate over CV has clarified several key issues related to nonmarket valuation and can provide useful guidance both to CV practitioners and users of CV results.

Hanson, Hatch and Clonts (2002) have estimated the impacts of six Alabama reservoirs on lakefront property values, recreational expenditures, and preservation values for scenarios of permanent changes to reservoir water quantity, using contingent valuation questions in on-site, telephone and mail surveys. The management of Southeastern U.S. water resources is important for future sustainable development. Alabama-Coosa-

Tallapoosa and Apalachicola-Flint-Chattahoochee River basins' water usage has evolved from power generation to multiple uses like recreation and housing. Changing use patterns imply changing resource values. CVM results showed that as summer full-pool duration decreased, lakefront property value decreased, and as duration increased, property values increased, but at a lesser rate. Similar findings occurred for winter drawdown alternatives. Permanent one-foot reductions in summer full-pool water levels resulted in a 4 to 15 percent decrease in lakefront property values. Recreational expenditures decreased 4 to 30 percent for each one-foot lowering of reservoir water levels. Current nonusers of the six reservoirs showed strong preferences for protecting study reservoirs with willingness to pay values of $47 per household or approximately $29 million for the entire six-reservoir watershed basin area. Resource management based on historic use patterns may be inappropriate and more frequent and comprehensive valuation of reservoir resources is needed.

Mathieu (2003) analyzed of the economic value of marine protected areas in the Seychelles or to determine tourists willingness to pay (WTP) for visits to Seychelles' marine national parks using contingent valuation method (CVM). A strategic issue facing many developing economies is the maintenance of natural resources, which are important in ecological terms as well as for providing income from tourism. In order to estimate tourists' WTP for visiting a marine park in Seychelles, three hundred interviews were conducted on three different islands in the Seychelles during June 1998. Most of the interviews took place on Mahe, the main island, around which the marine national parks Ste Anne, Port Launey, and Baie Terney are situated and the rest

of the interviews were conducted on the islands of Curieuse and Coco both being part of marine national parks. On Mahe, tourists were interviewed randomly on the beach and on Curieuse and l'Ile Coco. This study found that the visitors want to contribute for the preservation of marine parks of 61 Rupees (US$12.20), which exceeds the 50 Rupees (US$10) fee instituted in 1997. The average consumers' surplus per tourist is 11 Rupees (US$2.20), giving an estimate of the total consumer surplus of 440,000 Rupees (US$88,000), given that 40,000 tourists visited the Seychelles' MNPs in 1997. It is also found that significantly different WTP amounts are predicted depending on which particular marine parks are visited and the expectations of visitors to Seychelles.

Khan (2004) estimated recreational benefits of establishing and managing the Margalla Hills National Park near Islamabad using individual travel cost method. In developing countries, governments are often strapped for resources to protect, conserve and sustainable use natural resources. In such situations, ecotourism can play an important role in ensuring both natural resource conservation and economic growth. In developing countries, park entry fees are often low, or sometimes non-existent, generating little revenue for park management. The MHN Park is spread over an area of about 15,800 hectares. It is situated on the northern, eastern and western sides of Islamabad. It includes the Margalla Hills, Rawal Lake and Shakar Parian and was given the status of a national park in 1980. The study examines how much park visitors are willing to pay to visit and enjoy the park. In this study, the systematic random sampling technique is used to collect the data and took 1000 visitors as sample of the study which constitutes 1% of the total visitors to the park. Annual benefits from the Park are considerable -

total annual consumer surplus or economic benefit obtained from recreation in the Park is approximately Rs. 23 million (US$ 0.4 million). Various factors influence the value visitors obtain from the park — these include travel cost, household income and quality of the park. Improvements in the quality of the park are likely to increase recreational benefits by 39%. The study recommends that a Park entrance fee of Rs. 20 per person be introduced, which could be utilized for park management. This would generate nearly Rs. 11 million in revenues annually, a sizable amount of money that represents about 4% of the annual budget allocated to the Environment Sector in Pakistan.

Joanpoor & Smith (2004) calculated economic value of Historic St. Mary's City, which is a cultural heritage site using zonal travel cost method (ZTCM). Historic St. Mary's City located in rural southern Maryland, marks the 17th century British Colonial capital of the State of Maryland. Historic St. Mary's City is possessing public goods-type characteristics and for that reason to estimate welfare benefit estimates of it stated preference non-market valuation techniques is used. But this study employed a revealed preference methodology, ZTCM, to estimate consumer surplus welfare measures of the cultural heritage site. For that purpose three years of visitor sample data is used to compare three functional forms of visitor demand. The average of the annual individual consumer surplus measures ranged from approximately $8.00 to $19.26, depending on the functional forms used. When aggregated to the total number of individual paid visitors, the average annual benefit estimates range from approximately $75,492 to $176,550.

Hearth and Kennedy (2004) carried out a study to estimate the economic value of the Mount Buffalo National Park using travel cost method (TCM) and contingent valuation method (CVM). National parks have been established in many countries to preserve ecosystems and provide for recreation, wilderness and leisure demands of the population. The management of these parks has come under close scrutiny in recent times due to increased recreational pressure and consequent damage to the environment. In some cases in Australia, there have been irreversible losses in scenic and conservation values. The rapid growth of tourism coupled with fiscal conservatism has put pressure on park managers to generate their own revenues. The Mount Buffalo National Park is the oldest national park in Victoria, Australia. There has been a rapid increase in the number of visitors to the park during the last decade and park management has been a concern, especially in the light of declining budgetary allocations and potential damage due to the increased visitor numbers. Policy options to increase park revenue remain unclear because of a lack of information on demand parameters and user costs and estimates of TCM and CVM give a direction in making policy decisions. The relevant information is collected from 324 visitors randomly. The Consumer Surplus (CS) are Aus$ 17,057,625, Aus$ 20,804,466, Aus$ 21,501,628 and Aus$ 38,445,698 for the linear-log, double-log, linear and log-linear functions. The CS computed when time cost is excluded are Aus$ 11,401,331.0, Aus$ 10,667,329.8, Aus$ 11,316,127 and Aus$ 149,422,761 for the linear, double-log, linear-log and log-linear functions. The CS is very sensitive to the functional form and whether time cost is included or not. The CSs are much higher when time costs are included and the log-

linear function gave the highest CS without time costs. The computed average WTP using Dichotomous choice of CVM is Aus$ 12.5, which is much higher than the present entry fee of Aus$ 9.0 per car visit. The median was Aus$ 10. The majority of the respondents agreed that a price should be paid to enter the national park. The CS and WTP show that the economic value of the park is high and that there are opportunities to introduce innovative fee schemes to enhance its revenue. The TCM gives higher consumer surplus (CS) than the CVM because TCM provides estimates of Marshallian surplus, but the CVM estimates are Hicksian CS.

Cunha-e-Sa, Ducla-Soares, Nunes & Polome (2004) have conducted a study on the consistency conditions of contingent valuation and travel cost methods for mixed demand systems. CV and TC methods are the non market valuation methods are frequently used to measure value of environmental goods and services. CV and TC methods are the examples of stated preferences (SP) and revealed preferences (RP) methods respectively. Several authors put forward various methods to combining the SP and RP data of different origins and it reduces the effects of multicollinearity. But the data sets should not be combined unless they are consistent, i.e., they should come from a common underlying preference structure. The authors derived consistency conditions between TC and CV data in the context of mixed demand systems when valuing the changes in environmental quality. They also showed that these consistency conditions are a subset of the general conditions of rationality. The proposed consistency test procedure does not impose specific functional forms for TC and CV models. Instead, functional forms that better describe the data and are robust to misspecification can be

chosen. This consistency test can be the first step before polling the data. If consistency is not rejected, then an underlying common preference structure may exist. In a second step, the functional forms are developed for the TC and CV models that best fit the data and are associated with the same underling utility function. In this case, at least a subset of the parameters to be estimated with pooled data may be common to both TC and CV models when estimated jointly. Therefore, the efficiency of the estimates may be increased. The proposed consistency tests are implemented and the results are discussed in the context of TC and CV data for a sample of visitors to the Pamlico Sound, a recreational area in North Carolina. The data are collected randomly from 279 residents of Eastern North Carolina by a telephonic survey. This study is characterized by a world of two un-rationed goods and one rationed good, and a single discrete change in the quantity of the rationed good. Only a subset of the conditions for rationality can be tested for two levels of quality. The empirical results showed that it is only possible to combine CV and TC data when using stated demand in the sense that those decisions originate from the same preference structure and therefore are consistent. The rationality condition is also tested and it holds for 100% of the sample in all models.

Becker, at al. (2005) have used the Travel Cost Method (TCM) to estimate use value of viewing threatened Eurasian griffon vulture Gyps fulvus by the public at Gamla Nature Reserve, northern Israel. The proper valuation of non-market environmental commodities, such as recreation value of wildlife viewing or of a site such as a nature reserve, has significant policy implications. Failure to properly account of values of some environmental resources, however, has resulted in decisions that have had

negative implications for the environment and for society. If the results indicate that benefits outweigh costs, it will serve as an indicator of the need to further invest in protecting this species. In this study, zonal travel cost method is used because most people visiting Gamla do so only once or twice per year and ITCM requires a large sample of visitors that vary in their visitation rate. The necessary data were collected from 170 visitors of Gamla using a structured questionnaire, but only 143 are usable. The authors generated a visit-distance function and used it to derive the demand function for the site from which a monetary value could be estimated. The potential annual benefit of Gamla was estimated to be NIS 5.5–6.0 million (USD 1.1–1.2 million). The annual economic value of Gamla to the visiting public is approximately five times higher than the current revenue and 85% of the visitors to Gamla came to view vultures. This information can be used to estimate the benefits of further investment in Gamla Nature Reserve, to price this site according to demand if there are budget limits and in particular to invest in the protection of vultures and other threatened species.

Fix, Manfredo and Loomis (2005) have examined the convergent and predictive validity of the estimates of participation and revenue associated with different deer (Odocoileus hemionus) and elk (Cervus Canadensis) hunting license fees in Colorado with the help of CVM. For this purpose the authors comparing CV estimates of non-resident deer and elk hunter participation at increased fees to actual license sales after fees increased to test the predictive validity. They obtained the price of elk and deer licenses and the number of licenses sold in Colorado for the years 1975-1999 from the Colorado

Division of Wildlife (CDOW). This time period is used for the elk analysis; however, in 1999 licenses were limited for deer, so 1975-1998 time periods are used for the deer analysis. For this study a systematic random sampling is used to collect data from 6,785 resident and non-resident hunters who had purchased a deer or elk license in 1976 by telephonic survey method during 1997. With respect to convergent validity, elk license sale estimates from CV and historic analysis showed strong correspondence, but deer license sales from the two methods did not show strong convergence. Predictive validity test results showed that the CV model underestimate actual elk license sales at the increased fee by 31% and overestimated deer license sales by 55%. The implications for validity and applications of these methods to predict participation and revenue is that there must be correspondence between the product that was used to predict participation, or asked in a CV survey, and the product being offered. For this purpose effects of information on substitute goods provided to the respondents on the survey instrument should be explored.

Iamtrakul, Hokao and Teknomo (2005) discussed about the economic values of public parks (i.e. Saga Castle Park, Kono Park and Shinrin Park) in Saga city, Japan and they found that public parks as representative of urban green areas have played an excellent role against degradation of urban environment while keeping the rapid pace of urban growth. Development, maintenance and preservation of the quality of public park service, however, are tough issues faced by many city governments and communities. An approach to evaluate public park services is necessarily well established to identify users' benefit through travel cost method together with total expenses. This approach

highlights the dominant functions of public parks from users' point of view. Furthermore, the result showed a useful issue that plays a significant role in generating valuable economic information for local government policymakers to place suitable management plans in maintaining quality of public park service in association with the preference of community to achieve the goal of livable city.

Michailidis (2006) estimated economic values of three irrigation lakes using contingent valuation method, constructed at Panagitsa village (Region of Central Macedonia, Prefecture of Pella) and the study area is characterized, especially during the summer session, of limited water supply for irrigation purposes. Water supply in rural and urban areas is an issue of primary concern, especially in developing countries. It is assumed that consumers' satisfaction of water supply service, their opinions about the water management system and its affordability might have an impact on their Willingness to Pay (WTP). Various outputs were defined and each one's economic value was estimated. Water supply, recreation, health effects, social impact, environmental consequences and some more outputs were valued through the CVM. These values can assist managers and policy makers in making decisions regarding opportunity cost of the irrigation projects, their management options and the project's alterations or preservations. These values of the irrigation projects' outputs are estimated under the assumption that all other wetlands or water resources in the region remain unchanged.

Alberini & Longo (2006) estimated domestic visitors' use values for cultural heritage sites in Armenia, a transition economy in which conservation of cultural monuments is hampered by limited resources, by combining the travel cost data (TCM) with

contingent behavior responses. Respondents are interviewed at four cultural monuments (Garni, Haghardzin, Khor Virap, and Tatev) provided information on their visitation patterns, experience at the site, perception of the state of conservation of the monuments, and rating of the quality of services and infrastructure. The surplus (what the average person is willing to pay, above and beyond what he spends to visit the site) from the travel cost estimate is almost 22,000 AMD for Garni, 19,000 AMD for Haghardzin and Khor Virap and 13,850 AMD for Tatev, and contingent valuation estimate showed the total consumer surplus is 3,093 million AMD. This study also showed that conservation programs and initiatives that improve the cultural experience, or simply make it easier for the respondent to reach and spend time at the monument, are valued by domestic visitors and would encourage higher visitation rates. Actual and intended trips reported by the respondents exhibit good construct validity, in the sense that they are well predicted by price, location, hypothetical scenario and other individual characteristics of the respondents.

Pak and Turker (2006) estimated recreational use value of Kayabasi Forest Recreation site located in Trabzon City of the East Black Sea Region of Turkey using Individual Travel Cost (ITCM) and Contingent Valuation Methods (CVM). For this purpose a face-to-face interview is conducted on the site in summer session of year 2000 and relevant data are collected from 130 visitors which are representative of each visitor group. The value of Kayabasi Forest Recreation Site (Consumer Surplus) is estimated by using ITCM around 27.640 million Turkish Lira per person per visit. On the other hand, in CVM the authors put forward three different environmental situations in front

of the visitors and estimate willingness to pay (WTP) in these three different situations. Total WTP per year is calculated around 12.362 billion Turkish Lira in the current situation, 21.581 billion Turkish Lira in the developed situation 1 and lastly 25.287 billion Turkish Lira in the developed situation 2 of the Kayabasi Forest Recreation Site. It is also found that CVM gives lower estimate than that of the ITCM, because the economic crisis is continuously going on in Turkey and it affects the society badly.

Voelckner (2006) has conducted an empirical study on four different types of methods (first-price sealed bid auction, Vickrey auction, contingent valuation and conjoint analysis) which are used for measuring consumer's willingness to pay (WTP) in designing optimal pricing policies or for estimating demand for new products. The author considered two potential sources of differences in WTP estimates i.e., payment of the stated price is real or hypothetical. Real and hypothetical WTP within methods are compared and found that there are substantial and significant differences between WTP estimates reported by subjects depending on whether payment of the stated price was real or hypothetical. By comparing pairs of methods, found a significant difference between distributions of the individually measured reservation prices, with just one exception (first-price versus Vickrey auctions). Mean percentage differences of WTP among methods ranged between 2% and 26%.

Jabarin and Damhoureyeh (2006) have undertaken a study to estimate recreational value of Dibeen National Park (DNP) in Jordan using contingent valuation and travel cost method. A face to face survey of 300 visitors was conducted to elicit recreational value of DNP. In this study, Poisson regression analysis was used to estimate travel cost

model while the Tobit regression analysis was used to estimate the willingness to pay models. Using the TCM estimates average value of recreation in DNP was JD 71.55 (US$ 100) per person per recreation day. The mean willingness to pay for conserving and improving the services on DNP from open ended willingness to pay approach was JD 5.53 (US$ 7.8). The value of DNP to its users was could be estimated at approximately JD 13.6 million (US$ 19.2 million) a year using the TCM.

Hynes & Cahill (2007) assessed non-market value of additional recreational facilities in small-scale community-owned forestry by using contingent valuation technique (CVM) in Ireland. Total consumer surplus per visitor per year is estimated to €34.60 per year by using CVM. The results showed that community owned small-scale forestry can contribute enormously to the wellbeing of nearby urban residents, through the provision of outdoor recreational services. It is also found that additional amenities in the form of wildlife viewing hides and sculpture gardens would be highly valued by the individuals. It could be argued that facility improvements aimed at general forest users (e.g. nature watching facilities or sculpture gardens) may be most appropriate in forests close to urban areas. Special facilities (e.g. mountain biking or horse riding trails), could be installed in more remote sites, where a single activity for the site may be more appropriate and needs of the specialist group can more easily be catered for.

Rolfe & Prayaga (2007) estimated the value for recreational fishing at three major freshwater impoundments in Queensland, Australia by travel cost and contingent valuation methods. The value of existing usage has been estimated for two key subgroups of recreational anglers: frequent and occasional anglers using two different

types of travel cost models (Individual Travel Cost Method for Frequent and Zonal Travel Cost Method for occasional anglers), while the value of potential improvements to fishing experience has been estimated with CVM. Policy analysts often require estimates of value when analyzing the importance of recreation against other uses of impoundments, or when considering the potential for further investments, such as fish stocking programs. The results of the travel cost analysis provide strong evidence that recreational values vary between different groups of anglers and across sites, while the contingent valuation estimates provide values for additional marginal benefits of recreational angling.

Kaval (2007) conducted a study to determine recreation benefits of U.S. Parks. Over 90% of people living in the U.S. participate in some form of outdoor recreation, while traditional park activities are still popular (walking, family gatherings, picnicking, and wildlife viewing). These activities increase a person's wellbeing and are examples of recreation benefits. These benefits can be measured by using a variety of available techniques to calculate consumer surplus values. Data were collected from journals, extension bulletins, books, reports, and directly from authors over a period of twenty years. The resulting data set includes 1229 observations and spans 36 years (1968-2003), twenty-five types of activities, and 106 locations. All non-market benefit data were converted to 2006 U.S. dollars per person per day for comparison purposes. Of the 1,229 observations collected in the recreation benefit database, average non-market benefit of recreation was found to be $60.50/person/day in 2006 US$. Multiplying this value by the number of visitor days produces a net benefit from recreation in federal

parks of approximately $54.7 billion. Providing access to public parks increases welfare of United States citizens, in turn yielding an increase in the welfare of the country. Benefits were then analyzed by park type. Park types include national parks, national forests, state parks and state forests, and those studies that either included multiple park types or did not specify. Results were similar for national forests ($55/person/day), state parks and state forests ($53/person/day) and those areas that were not specified ($59/person/day). National parks stand out, however, with a recreation benefit at least twice as high as the other areas ($128/person/day). Of the twenty-five different activities assessed, benefits ranged considerably, from $6 to $174/person/day (2006 US$). With such wide ranging benefits, the activities were divided into three groups – high value (>$100/person/day), moderate value ($35 to $100/person/day) and low value (< $35/person/day). High value recreation activities include mountain biking, canoeing, kayaking, and rafting, backpacking, bird watching, and rock-climbing. Visiting environmental education centers produced the lowest value, with most other activities exceeding $20/person/day.

Rolfe & Dyack (2007) explored some of the reasons why estimates of recreation values generated through Contingent Valuation Method (CVM) tend to be lower than those generated through Travel Cost Method (TCM). The analysis is conducted through a case study approach of recreation values for Coorong on the Murray River in the south-eastern part of Australia. In this study 790 respondents are interviewed randomly. Values per adult visitor per recreation day are estimated with TCM at $149 and with CVM at $116. A number of methodological and framing issues which explain these

value differences are tested and found that the most important of these are likely to be the different decision points underpinning data collection and consideration of substitute sites, strategic responses and treatment of uncertain responses within CVM.

Fleming and Cook (2007) have used the travel cost method to estimate recreation use value for Fraser Island in terms of consumer surplus. This is not the total economic value of the Island as non-use values and, for example, scientific, medicinal, and ecological values have not been included. For this purpose 1,360 schedules are distributed among the visitors in 2006 and out of these 430 were useable, giving a response rate of 31.6%. To obtain recreation value estimates for Lake McKenzie the appropriate proportion was calculated using two methods – a measure of satisfaction as reported in the survey, and a measure of time spent at the lake as a proportion of total time on Fraser Island. The consumer surplus estimates for Lake McKenzie using the two methods of proportioning value have yielded greatly differed values. Using the satisfaction measure obtains a consumer surplus ($578.37 per person per visit for all samples) more than twice the size of that obtained when the proportion of time is used ($256.53 per person per visit for all samples).

Boontho (2008) estimated economic value of Phu Kradueng National Park by travel cost method (TCM) and contingent valuation method (CVM). For this purpose the data were collected from 1,016 users and 1,034 non-users by conducting two large scale surveys on users and non-users. The data were analyzed using multiple linear regression analysis, logistic regression model. Using the travel cost method it is found that direct benefits to park users or visitors' total willingness to pay per visit was 2,284.57 bath, of

which 958.29 bath was travel cost, 1,129.82 bath was expenditure for accommodation, food, and services, and 166.66 bath was consumer surplus or the visitors' net gain or satisfaction from the visit (the integral of demand function for trips). Thai visitors to Phu Kradueng National Park were further willing to pay an average of 646.84 baths per head per year to ensure continued existence of Phu Kradueng National Park and to preserve their option to use it in the future. On the other hand, Thai non-visitors are willing to pay an average of 212.61 baths per head per year for option and existence value provided by the Park and the total economic value of Phu Kradueng National Park to Thai visitors and non-visitors taken together is approximately 9,249.55 million baths per year. The users' average willingness to pay for access to Phu Kradueng National Park rises from 40 baths to 84.66 baths per head per trip for improved services such as road improvement, increased cleanliness, and upgraded information.

Loureiro, Loomis & Vazquez (2009) calculated economic value of environmental damages caused by the Prestige oil spill to the Spanish society in terms of passive use and environmental use value lost. For that purpose a parametric and non-parametric analysis of data from a contingent valuation (CVM) survey is conducted in 2005-06. The CVM survey was implemented using in person interviews. Parametric WTP estimation indicates that respondents in the sample are willing to pay about 40.51€ per household to avoid a similar future oil spill in Spain. This implies that on average, the Spanish society places a value of environmental losses caused by the Prestige oil spill around 574€ million. Non-parametric estimates are slightly higher at 58.08€ per household.

Stackelberg & Hammitt (2009) carried out a research work on combining stated preference approaches for valuation within a risk assessment framework and this approach is used for estimating the benefits and costs of environmental policies with the goal of improving risk-based decision making. For this purpose an integrated human health and ecological risk model is developed and using a case study approach to inform a set of contingent valuation (CV) surveys which in turn provide economic values for the benefits of risk reductions. Respondents showed a nearly proportional, positive relationship between decreasing the risk of a 6-point reduction in IQ (a standard measure of "intelligence") and WTP, but showed a negative relationship between risk reduction and WTP for reading comprehension as an outcome. The range of mortality risks that respondents would accept on behalf of their (hypothetical) 10-year-old child is 2 in 10,000 to 9 in 1,000 per IQ point, and WTP per IQ point is $466 ($380, $520). Quality Adjusted Life Years (QALY) weights elicited via time trade-off (reduction in life expectancy) were significantly different from QALY weights elicited via a standard gamble (p = 0.001). Respondents who answered questions about ecological endpoints first were willing to pay a small additional amount when asked about human health effects, but those respondents who answered questions about human health endpoints first were not willing to pay any additional amount when subsequently asked about ecological effects.

O'Garra (2009) has estimated bequest values to local users of a traditional fishing ground on the Coral Coast of Fiji, using contingent valuation approach. Communities owning and living on ancestral land tend to have a strong sense of stewardship over the

land and its resources, which may translate into an economic value to present generations of being able to pass on ancestral lands to future generations (i.e. bequest value). This study was carried out in the *Navakavu* community, located on the Muaivuso peninsula, 13 km west of Fiji's capital, Suva. Using monetary as well as time-based contributions, bequest values are estimated at between FJ$ 1.25–1.41 (US$ 0.64–0.73) per individual per week, or FJ$ 183.90 (US$ 106.91) per household per year. This represents a significant proportion of stated average household expenditure, comparable to spending on durable household goods, and clothes and footwear. These results suggest that low-income groups may have significant bequest values, which should be accounted for in developing-economy valuation studies.

Li, Liu, Zhang & Li (2009) assessed the monetary cost of coastal recreational resources in Qingdao using travel cost method (TCM). The geographical range of Qingdao's coastal recreational resources (many famous coastal natural scenic sites and a few cultural sites) begins from Tuan Dao from the west and ends at the east at the Lao Mountain Scenic Area. The survey was conducted at the Old Stone Man Bathing Beach, Statue Park, May Fourth Square, Ba Da Guan, No. 1 Bathing Beach, Pier, Lu Xun Park, etc. sites and questionnaire was distributed randomly to 600 people. The data collected in this investigation only covered tourists in mainland China, excluding tourists from Hongkong, Macao, Taiwan, and overseas. The total revenue produced by Qingdao's coastal recreational resources is about RMB 5.51×10^{10} annually. The data processing software named Eviews was used to determine tourists demand curve and to calculate their residual and actual travel expenses. The results of the study can provide a

scientific basis for applicable industries interested in development and management decision-making. Therefore, this study assesses the reasonable usage of coastal recreational resources.

Lee, at al. (2009) estimated economic value of public interpretative services at a publicly supported Korean bird watching festival, using a dichotomous choice contingent valuation method. Resource interpretative services are an essential conservation management tool that can add value to ecotourism experiences. Two visitors' groups in the festival are interviewed- one group was visitors who only attended the festival and the other group was those people who participated in the bird watching bus tour before or after enjoying the festival. Logit estimation results indicate that bid is the most statistically significant variable in explaining WTP for bird watching interpretative service. As expected, an inverse relationship is found, indicating as the bid amount increases, the probability of WTP 'yes' response decreases. Age, income and bird watching experience are also statistically significant (10% level or less) factors explaining WTP. Inference from the estimated model is that older, higher incomes, experienced respondents have a larger WTP for bird watching interpretative services. Truncated mean WTP indicate that the economic value of public bird watching interpretative service is approximately 4,961 South Korean Won (equivalent to approximately US $5) per person, which is a value-added service to the bird watching resources. Overall, respondents appeared to be satisfied with the interpretative services provided by the bus tours.

Latifi at al. (2008) have conducted a recreational valuation study of the Abbas Abad Forest Park in North Iran using travel cost method and they found that the most important benefits of a forest, which can be considered over the revenue yielded from timber and other wood based products, is the recreational benefits for visitors. Based on the method, the park was considered as the centre of the fivefold region as concentric circles. The number of visitors was determined using questionnaires and the park's value was determined by estimation of the visitors access cost using Travel Cost Method. Furthermore, the economic value extracted timber products of the neighboring forestry plan was reckoned. The calculated factor was then compared to the economic value of the park. As a result, the park's recreational value was judged to be much more than produced timber values. Therefore, it is concluded that unparalleled natural, historical and bio-environmental values of the park would be preserved by planning an appropriate and well- programmed management system, considering the unique conditions of the Park. Thus, it can fulfill recreational requirements of the people in the local/national scale.

Marawila and Thibbotuwawa (2010) evaluated recreation related social welfare benefits that visitors derive from the Diyawanna Oya wetlands in Sri Lanka. The study employs the Individual Travel Cost Method in order to estimate the welfare gains from recreation as well as changes in consumer surplus if authorities were to convert parts of the wetland to other development uses. The study also assesses the present value of non-market benefits from preserving the site. Not even the wide spectrum of ecosystem services generated have been successful in arresting the rapid decrease in the coverage

and quality of urban wetlands in Sri Lanka over the past few decades. In recent years, the rapid conversions of wetlands for development purposes has become a serious problem because such unplanned development in or around wetlands has a negative effect on urban and sub-urban communities. The Diyawanna Oya wetland ecosystem has proven to be an important recreational site in Colombo in the face of growing demand for urban recreational amenities. It provides a wide spectrum of use- and non-use benefits, including production, hydrological, and ecological values. However, the wetland suffers from both inadequate recognition of these benefits and poor representation in the national protected area network. In this study, stratified random sampling was used to collect primary data from 500 visitors of the wetland. The findings indicate that the Diyawanna Oya wetlands generate an annual consumer surplus of LKR 3,890 million (or USD 35 million) to people who use the area for recreation. The welfare loss from converting the natural wetland area to development projects is LKR.19.45 million (or USD 173,107) per hectare. It also shows that imposing an entry fee (the equivalent of LKR.50) will increase government revenue by LKR 5.4 million (or USD 48,055).

Casey, Brown and Schuhmann (2010) have estimated the willingness to pay amount of the tourists for an entrance fee in Riviera Maya, Mexico by using a discrete choice contingent valuation method and the necessary data are collected from 400 visitors using a structured schedule. Results suggest that there are significant possibilities for implementing a “coral fund” to raise revenues for coral protection programs in the Riviera Maya region of Mexico’s Yucatan Peninsula. In this study, both parametric and

non-parametric methods are used to estimate mean willingness to pay (WTP) for protection of corals and found that all methods produced relatively similar values for mean WTP, ranging from $42 to $58. With approximately five million visitors passing through the Cancun International Airport each year, this suggests that it may be possible to collect between $100 and $400 million annually for coral reef management programs.

Xuewang, at al. (2011) measured recreational value of Jiuzhaigou, one of the World Natural Heritage sites in China by employing Contingent Valuation Method (CVM), which is an evaluation instrument on the basis of tourists′ attitude and preference, and analyzed the biases in the survey. World heritage possesses various kinds of use value and non-use value. Measuring the recreational value of world heritage sites is a key issue in the heritage tourism. It is found that Jiuzhaigou′s recreational value was 3.46×108 Yuan (RMB), and per capita Willingness to Pay (WTP) was 137.31 Yuan by CVM in 2009. And also found that among the factors that influence Jiuzhaigou tourists′ WTP, psychological perception factors have the greatest effect while demographic and socio-economic characteristics have a small effect on WTP. The virtuosity in CVM creates biases both from CVM itself and in the procedures that CVM was implemented. The former includes hypothetical bias, information bias, protest response bias, and strategic bias; and the latter includes the questionnaire design, population and sample definition, sampling and data processing. The paper analyses those biases and illustrates their potential influences on the accuracy of CVM measurement.

2.1.2 Studies Conducted in India

A very few number of studies have carried out recently to estimate economic value of environmental resources in India despite the fact that India is rich in environmental resources and services. It is a new area of research in this particular country.

Hadker, Sharma, David & Muraleedharan (1997) estimated WTP of the dwellers of the Bombay City for the management and preservation of the Borivili National Park using double bounded dichotomous choice of Contingent Valuation Method. The study followed face to face interview of the people of Bombay. The WTP is estimated to be Rupees 248 million per annum giving much attention to the starting point bias, hypothetical bias, embedding effect and part-whole bias. This gives an idea that people are concerned and aware about importance of the National Park. It is derived that education has a positive impact on WTP of the people.

Maharana, Rai and Sharma (2000) estimated WTP of the local community members and domestic visitors for maintenance and conservation of the Khangchendzonga National Park in Sikkim Himalaya, India by using the Contingent Valuation Method. It is found that the average WTP for conservation of the national park, by local community member was US$ 6.20 per household per year and US$ 1.91 per domestic visitor per visit. The WTP estimate was strongly influenced by mainly three variables such as age, education and income. The authors recommended that in the developing countries, CVM may be turned out as a useful tool for decision-makers regarding various investment and policy purposes for environmental resource management.

Rai, Maharana & Sharma (2000) quantified sacredness or recreational value of Khecheopalri Lake, situated in the West District of Sikkim State of India, to local pilgrims and its recreational value to visitors by applying travel cost and contingent valuation methods. The lake is a cornucopia of sacredness and high biodiversity, and a site of ethnicity to which a large number of visitors are attracted for both pilgrimage and recreation. Although monetary valuation of natural ecosystems is difficult, such valuation helps to draw attention to their importance, and highlight conservation needs, especially in developing countries. The study was based on a sample survey of 360 respondents, consisting of 50 members of the local community, 140 pilgrims (from within Sikkim), 95 residents (from outside Sikkim within India) and 75 non-residents (from outside the country) in 1998. The demand curve function for recreation increased with decreases in travel cost and distance for Sikkimese visitors. Willingness to pay for maintenance and preservation of the lake by all types of visitors ranged from US$ 0.88 for members of the local community to US$ 7.19 for international tourists. The TCM model using particularly the local pilgrims' response put the sacredness value at US$ 30186. The CVM estimation for all tourists gave US$ 46940 for the maintenance and preservation of the lake.

Ranghavan (2006) has discussed about the prospect of ecotourism in Kerala. In this paper he stated that tourism has become Kerala's core competency sector creating employment, enhancing production, productivity and contributing significantly towards development of the state. But to encase the opportunity and to reap the benefit of conducive social atmosphere may be created to develop tourism as viable sector which

has greater potential for generating employment and alleviating poverty. Kerala has endowed with scenic beauty, flora and fauna, art and culture, backwaters, lagoons, traditional festivities, and long lying beaches and rainy hills. The earnings from tourism in Kerala in 2002 were Rs.705.67 Cr and it increased to Rs.983.37 Cr in 2003. The travel and tourism industry in Kerala directly and indirectly contribute nearly 8 lakh jobs which account 6.2% of total employment in the state. Author recommended that to realize the economic benefit in a concrete way, social mindset should changed to create a better atmosphere to pave the way for development of the tourism industry for betterment of the state and the people.

Chaudhary and Tewari (2006) were undertaken a study to quantify recreational benefits of urban forestry of Chandigarh in India, by contingent valuation method (CVM) with open-ended (OE) format and zonal travel cost method (ZTCM). In a developing country such as India contingent valuation method (CVM) cannot always provide a correct valuation of recreational use benefits of an environmental resource given the huge size of the parallel economy involving different categories of middle to upper income group families which have the capacity to move as tourists. The study was mainly based on primary data, which was collected by using structured and unstructured interview schedules and the Participant observation method and the authors carried out interviews personally during summer and winter seasons of the year 2002. In the present study consumer surplus estimated by ZTCM is calculated as Rs. 308/-, whereas from OE CV format it is Rs. 6.73/-. The study shows that in a developing country such as India, the gap between the two estimates as provided by ZTCM and CVM (OE) is much more in

comparison to the developed countries. This is because of the fact that TCM is based on observed behavior of the respondents in actual markets, i.e. based on revealed preference, whereas CVM is based on expressed or stated preferences. In this study a 'corruption perception index' (i.e., the ratio of consumer surplus estimated in TCM and CVM) has been developed in the case of tourists and found that this index value was greater than the value which was estimated in developed countries.

Borthakur (2007) has estimated recreational value of Kaziranga National Park (KNP) using zonal travel cost method. The survey was conducted in two phases (October to December, 2004 and January to March, 2005) and 350 domestic and 53 foreign visitors were interviewed using stratified random sampling. By estimating the zonal travel cost method it is found that consumer surplus value for KNP is around Rs. 30.65 million per year and the total biodiversity recreational value of the park is around Rs. 27.08 million per year.

Chaudhary and Tewari (2008) estimated recreational value of the rock garden of Chandigarh in India using zonal travel cost method (ZTCM). Parks and gardens have significant amenity and recreational value contributing towards quality of urban life. Many of the intangible benefits of such parks/gardens are neither correctly assessed nor incorporated in to benefit-cost analysis of developmental or commercial projects and in budget allocation process, especially in developing countries. Chandigarh, a well-planned and modern city of India, is known for its urban parks and gardens worldwide. Among various tourist places of the city, Rock Garden assumes premier importance for the tourists. Unlike other parks and gardens of the city, it consists of a series of

interconnected rocky grottoes, walkways, landscaped waterfalls and thousands of animal or humanoid figures made out of waste and discarded materials. For this study, the authors conducted in-person survey of 904 families in 2002-03 and took only the domestic tourists as sample. It was found that annual recreational value of the urban parks/gardens of the Chandigarh was Rs. 92.40 millions and this strange and whimsical garden account for about seventy percent of annual recreational use value accruing to the city's overall urban parks and gardens from the view point of domestic tourists.

Guha and Ghosh (2009) estimated recreational demand for Indian Sundarban mangrove forest using Zonal Travel Cost Method. The Sundarban is well known for both its mangroves (one of the three largest single tracts of mangrove forest in the world) and for being the home of the Royal Bengal Tiger. In this method, the costs incurred by a visitor for a trip can be used as a proxy for the recreational value placed by him for it. The authors divided the tour packages to Sundarban into seven broad categories. In this study the information is collected in two distinct sets: firstly, collected the data from 73% of all visitors from the entry permits for visiting Sundarban about their place of origin between the 3rd week of November, 2005 and the 2nd week of March, 2006. The second set of data comprises travel costs and other individual and household level information obtained from the visitor survey conducted simultaneously during the same period and took interview of 906 visitors randomly using a structured questionnaire with a single respondent from each family chosen in the sample. In this study only 1% is foreign tourists of the 1st set of data (i.e. 73% of annual visitors) and the authors have left out the visitors originated from outside India from the study. With the help of

visitors addresses the authors divided them into eight zones. Most of the visitors are educated and employed in the service sector. Based on the ZTCM, the authors estimated annual recreational value of the Indian Sundarban, using double-log form, to be approximately INR 15 million (US $377,000). The current entry fees to visit the Sundarban are very low and park authorities are able to capture less than 10% of this consumer surplus. To maximize revenues, the current fees of the INR 15 can be increased to INR 154 per visitor per day. This would increase total revenues by more than 300%, bringing nearby INR 5 million (US $0.12 million) per year to the park. The infrastructural facilities (like electricity and transport) are too poor in that region and concluded that by improving these facilities visitations and revenues can be increased.

Singha (2010) has conducted a study to estimate willingness to pay for preservation of the Kaziranga National Park using contingent valuation method. For this purpose information is collected from 150 visitors of the park randomly in the month of February, 2009. The estimates of the logit model showed that WTP for maintenance of KNP is to be Rupees 30.10 per respondents per month and total economic value of KNP for a year is Rupees 1,95,04,800. In this study, foreign visitors are excluded from the sample and construct validity test is carried out. In this test the author compared the estimates of her study with a study which estimates the mean WTP of the people of Bombay for preservation of Borivili National Park in 1997 (Hadkar at al., 1997).

2.2 Research Gap

Evidently, only a few studies have been carried out in India and the subcontinent on the valuation of public parks and sanctuaries, in contrast with the vast amount of literature that has accumulated over the years in foreign countries. There are only three valuation studies conducted in north eastern states of India. Out of these three, two studies have estimated recreational or economic value of the Kaziranga National Park of Assam and in the other, recreational value of Khecheopalri Lake of Sikkim is estimated. The present study has been carried out due to three reasons:

Firstly, recreational value of Kaziranga National Park (KNP) is already estimated in 2007 by using zonal travel cost method (Borthakur, 2007). But in this study the researcher does not give any importance on revenue maximization entry fee and so it is not estimated. An obvious research gap emerges due to this.

Secondly, economic value of KNP has been already estimated using contingent valuation method (CVM) (Singha, 2010). CVM is used in a hypothetical situation. So to test the reliability of the CVM estimates four validity tests are there. In this study the author carried out the construct validity test, in which the estimates of her study is compared with the estimates of a study which is conducted to estimate mean WTP of the people of Bombay for preservation of Borivali National Park in 1997 (Hadkar at al., 1997). Generally comparison is conducted between those studies which are carried out at the same point of time and have same model specifications and same socio-economic and environmental situations. But here comparison is carried out between WTP of the

people of Bombay and WTP of Indian tourists visiting KNP in Assam at different time points – about 14 years to be precise. The socio-economic conditions of the visitors of KNP are also not similar with the people of Bombay. Singha (2010) excluded the foreign visitors from her study, but from the last five years figure it is found that around 5 percent of the total tourists of KNP are foreigners and it may has a great influence on the WTP estimate and as well as on economic value of the park.

Thirdly, one horned Indian rhinoceros are only found in Assam and many of the visitors from far off places are making trips to KNP only for viewing this unique wild animal. So it has a great influence on economic value of the park, but poaching of this animal is continuously going on in the park. Therefore in this study, importance of the existence of one horned Indian rhinoceros in the economic value of the park is estimated in monetary terms by using open-ended contingent valuation method.

Fourthly, tourism around Kaziranga National Park depends mainly on visitor's trip to the park. Socio-economic characteristics of the tourists and distances between the park and places of origin affect their decisions regarding making trip to KNP. To sustain the eco-tourism of KNP, it is very important to know how these variables affect their trips to the park and hence this type of analysis is also carried out in this study.

Chapter 3

3.1 Introduction

Kaziranga National Park is the pride of the North East India and is one of the primmest national parks in the globe. It is not only the home land of the one horned Indian rhinoceros, but also provides shelter to a variety of wild lives. Brahmaputra river flows on the north and Karbi Anglong Hills on the south of the national park between 26°30 N to 26°45 N Latitude and 93°08 E to 93°36 E Longitude. The park is divided into four parts or ranges for administrative purposes and these are Ghorakati (Burapahar Range), Baguri (Baguri Range), Kohora (Central Range) and Agoratoli (Eastern Range) respectively. Normally sub-tropical climate prevails in the park. The temperature in KNP varies from 38^0C (maximum) to 7^0C (minimum) and average rainfall is 1320 mm per annum. It is world famous because it is the home land of one-horned Indian rhinos. About ninety percent of total one-horned Indian rhinos are found in Kaziranga National Park and Pobitora Wildlife Sanctuary of Assam. Map of Kaziranga National Park is shown in Figure 3.1

Figure 3.1 Map of KNP

Source: Forest Department, KNP

3.2 History

The history related with protection of Kaziranga starts in early twentieth century when Baroness Mary Victoria Leiter Curzon, wife of the Viceroy of India visited the area in 1904 for the first time and she told her husband to forward necessary steps to save the wild animals especially rhinos of Kaziranga. As a result of it the Viceroy of India, Lord Curzon proposed and create a reserve in Kaziranga with an area of 232 km^2 of land on 1st June of 1905 by notification of the Chief Commissioner of the area. In 1916 Kaziranga became a game sanctuary and officially closed for shooting in 1926. It was first opened for visitors or tourists in 1938 and declared as a Wildlife Sanctuary in 1950. The Legislative Assembly of Assam passed the Assam (Rhinoceros) Bill in 1954 for giving legal protection to the rhinoceros and imposed heavy penalties for killing any of them. With the passing of the Assam National Park Act of 1968 Kaziranga became a National Park with an area of 429.93 km^2 from January 01, 1971 and in 1985 it is notified as World Heritage Site by UNESCO. Kaziranga is declared as the 29th Tiger Reserve in 1999.

With the passes of time human activities have increased on the periphery of southern boundary of the park, like establishment of tea gardens, human settlements, agricultural activities, etc. It has increasingly become a problem for the wild animals to move across the hills during floods and poachers easily killed them. It faces the problem of river bank erosion on the northern part due to Brahmaputra River and on the other hand the river also creates chapories (River Islands), the wild animals of the park move to these chapories because it creates well natural habitats for them. Moreover, the population of

the wild animals in the national park has increased over time. Because of these reasons the Government of Assam had notified a number of proposed Addition to the Kaziranga National Park since mid 1980s to preserve the ancient wild animal corridors and routes in case of high flooding. So the Government included section of the Brahmaputra River to the north and a part of Mikir Hills to the south of the park in 6th Addition to provide shelter to the refuge wild animals during floods and it is shown in Figure 3.2.

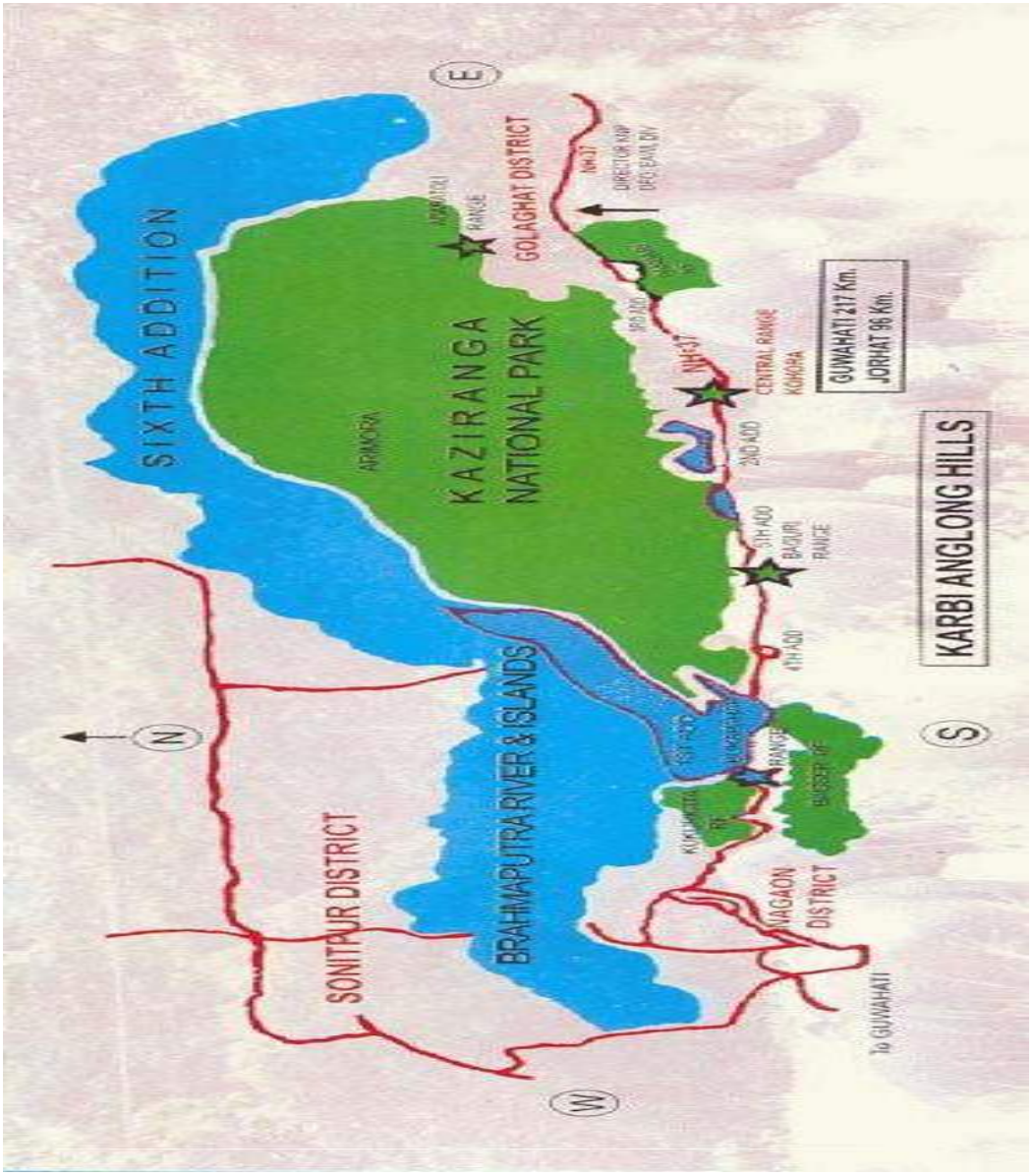
Table 3.1 Area of the Kaziranga National Park

Name of the National Park/Addition	Area (Sq Km)	Date of Notification (Preliminary)	Final Notification Date
Kaziranga National Park (KNP)	429.93		11/02/1974
1st Addition to KNP	043.79	28/9/1984	28/05/1997
2nd Addition to KNP	006.47	10/07/1985	Not Completed
3rd Addition to KNP	000.69	31/05/1985	Not Completed
4th Addition to KNP	000.89	13/06/1985	03/08/1988
5th Addition to KNP	001.15	13/06/1985	Not Completed
6th Addition to KNP	376.5	10/09/1984	07/08/1999
Total	859.42		

Source: Forest Department, KNP

The Additions of areas to the park boundary are shown in the Table 3.1. The total area of the national park becomes 882 sq km because Panbari RF and Kukurakata RF, with an area of 7.65 sq km and 15.93 sq km respectively, are also comes under the overall management of the Kaziranga National Park.

Figure 3.2 6th Additions of Areas to KNP Boundary



Source: Forest Department, KNP

3.3 Flora and Fauna

3.3.1 Flora

Kaziranga National Park is world famous for its biodiversity and natural beauty. Its total area is covered by forests, grasses, beels (water bodies), sand, etc. The Kaziranga National park's total area under different land covers are shown in Table 3.2 and it is done on the basis of satellite image of park.

Table 3.2 KNP under Different Land Covers

Sl. No	Land Cover Type	Area (Sq. Km.)	Area in Percentage
1.	Woodland	114.01	27.95
2.	Short Grass	12.3	3.01
3.	Tall Grass	248.85	61.01
4.	Beels/Water logged	24.32	5.96
5.	Jiya Daphlu/Swampy	3.96	0.97
6.	Mora Diphlu/Swampy	2.84	0.7
7.	Sand	1.62	0.4
Total		**407.9	100.00

Source: Forest Department of KNP

**Eroded areas are excluded

The western part of the National Park is mainly covered by grassland, with tall 'elephant' grasses on the higher grounds and short grasses on the lower grounds. These grasses are maintained by the combine activities of nature and human, means by annual flooding of the Brahmaputra River and burning (it is done every year by the Forest Department of the park). The park mainly covered by grasses and forests. The grasses are numerous shrubs and tropical wet evergreen forests are mainly dominated by various types of trees like *Aphanemixis polystachya, Talauma hodgsonii, Dillenia indica, Garcinia tinctoria, Ficus rumphii, Cinnamomum bejolghota* and species of *syzygium.* Common trees and shrubs under semi evergreen composition are *Albizia procera, Duabanga grandiflora, Lagerstroemia speciosa, Crateva unilocularis, Sterculia urens, Grewia serrulata, Mallotus philippensis, Bridelia retusa, Aphania rubra, Leea indicaand Leea umbraculifera*.

3.3.2 Fauna

There are various types of mammals and birds are found in Kaziranga National Park.

(A) Mammals

There are around thirty five (35) species of mammals are found in Kaziranga National Park out of these fifteen are belong to Schedule 1 of Wildlife Protection Act' 1972. It is the homeland of Indian one horned Rhinoceros. It is world famous because World's largest population of Indian Rhinoceros (*Rhinoceros unicornis*) and Asiatic Wild Buffalo (*Bubulas bubalis*) are found here and provides natural habitat for Royal Bengal Tiger (*Panthera tigris*) to attain their highest ecological density.

Table 3.3 Population of Important Wild Animals in KNP

Species	Years									
	1997	**1999**	**2000**	**2001**	**2002**	**2005**	**2006**	**2007**	**2008**	**2009**
Rhino	-	1552	-	-	-	-	1855	-	-	2048
Elephant	945	-	-	-	1048	1246	-	-	1293	-
Tiger	80	-	86	-	-	-	-	-	-	-
Swamp Deer	-	398	468	-	-	-	-	681	-	-
Wild Buffalo	-	1192	-	1431	-	-	-	-	1943	-

Source: Census Report of Wild Animals of Forest Department of KNP

Other mammals which are found in the national park are Capped Langur (*Presbytis pileatus*), Hoolock Gibbon (*Hylobates hoolock*), Leopard (*Panthera pardus*), Sloth Bear (*Melursus ursinus*), Indian Elephant (*Elephus maximus*), Gangetic Dolphin (*Platanista gangetica*), Otter (*Lutra lutra*), Wild Boar (*Sus scrofa*), Gaur (*Bos gaurus*), Sambar (*Cervus unicolor*), Swamp Deer (*Cervus duvauceli*), Hog Deer (*Axis porcinus*), Barking Deer (*Muntiacus muntjak*), Common langur (*Presbytis entellus*), Rhesus Macaque (*Macaca mulatta*), Assamese Macaque (*Macaca assamensies*), Indian Porcupine (*Hystrix indica*), Fishing Cat (*Felis viverrina*), Jungle Cat (*Felis chaus*), Large Indian Civet (*Viverra zibetha*), Small Indian Civet (*Viverricula indica*), Common Mongoose (*Herpestes edwrdsi*), Small Indian Mongoose (*Herpestes auropunctatus*), Indian Fox (*Vulpes bengalensis*), Jackal (*Canis aureus*), Chinese Ferret Badger (*Melogale*

moschata), Hog Badger (*Arctonyx collaries*), Eastern Mole (*Talpa micrura*), Pangolin (*Manis crassicaudata*), Squirrel (*Dremnonys lokriah*), Bats (*various species*) etc.

The Forest Department of Kaziranga National Park conducts census to count total numbers of important and endangered wild animals of the park at various point of times. Total numbers of important wild animals of KNP are shown in Table 3.3.

(B) Birds

During winter, more than thousands of migratory birds (which represent over hundred species) visit the park seasonally from as far as Siberia. Around 6% of total area of KNP is water bodies and it constitutes rich reservoir of food for these migratory birds. The Forest Department has been recorded a total of 478 species of birds in the park in 1999, out of which 25 are globally threatened species and 21 are near threatened species. The globally threatened species recorded in Kaziranga National Park are Swamp Francolin (*Francolinus gularis*), Lesser White fronted Goose (*Anser erythropus)*, Ferruginous Pochard (*Aythya nyroca*), Baer's Pochard (*A. baeri*), Blyth's Kingfisher (*Alcedo hercules*), Pale capped Pigeon (*Columba punicea*), Bengal Florica (*Houbaropsis bengalensis*), Nordmann's Greenshank (*Tringa guttifer*), Black bellied Tern (*Sterna acuticauda*), Palla's Fish Eagle (*Haliaeetus leucoryphus*), Greater spotted Eagle (*Aquila clanga*), Imperial Eagle (*A.heliaca*), Lesser Kestrel (*Falco naumanni*), White bellied Heron (*Ardea insignis*), Spot billed Pelican (*Pelecanus philippensis*), Dalmatian Pelican (*P.crispus*), Greater Adjutant (*Leptoptilos dubius*), Lesser Adjutant (*L.javanicus*), Hodgson's Bushchat (*Saxicola insignis*), Rufous vented Prinia (*Prinia*

burnesii), Bristled Grassbird (*Chaetornis striatus*), Mah Babbler (*Pellorneum palustre*), Jerdon's Babbler (*Chrysomma altirostre*), Black breasted Parrotbill (*Paradoxornis flavirostris*), Finn's Weaver (*Ploceus megarhynchus*). Besides there are more than 40 species of fishes, 7 species of Reptiles, 5 species of Amphibian are found in Kaziranga National Park.

3.4 Tourism

When the status of wildlife population of the country as well as of the globe have declined due to destruction of habitat and indiscriminate killing, there was a growing awareness amongst some section of Wildlife and nature lovers that it was high time to do something to preserve these unique wildlife. Due to this awareness people started taking interest in Kaziranga or making trips to this National Park. Kaziranga was opened to interested visitors in 1937 for viewing its unique wildlife and two elephants were posted for taking the visitors into the park. Kaziranga is one of the best spots for wildlife viewing and its popularity amongst the tourists has been growing since then. The facilities for tourists were limited for the period of 1937 to 1950 and accommodation consisted mainly of a P.W.D. inspection bungalow at Kaziranga and a Forest rest house at Baguri. This accommodation was found grossly inadequate for meeting the demands of increasing number of incoming visitors due to which one visitor's camp at Kaziranga and later on two tourist lodge were constructed by the department on small hillock at Kohora and one Forest Rest House was also constructed at Arimora. The management of these two Tourist Lodges was handed over to the

Tourism Department in 1963 after the creation of this new department under the Govt. of Assam.

At present about fifty private and public hotels and lodges are giving services to the visitors of the park, out of these four are public lodges and these are run by the Assam Tourism Department. But most of these hotels are not owned by the local people and a few local people are employed in low grade posts of these hotels and lodges. In the four public lodges, 5,993 visitors from different places have stayed in 2009-10. There are 61 office staffs in Assam Tourism Department of the park (2009-10) and they are facilitating various types of services to the tourists. The total salary of the department and revenue collection by these four lodges are shown in Table 3.4.

Table 3.4 Cost and Revenue Collection of Assam Tourism Department

Year	Total Costs in Paying Salaries per annum in Rs.	Revenue Collection per annum in Rs.
2005-06	67,43,495.00	6,51,610.00
2006-07	70,96,248.00	6,20,960.00
2007-08	72,06,478.00	7,76,030.00
2008-09	76,58,210.00	7,39,755.00
2009-10	86,57,388.00	10,57,296.00

Source: Assam Tourism Office, KNP

Visitors from various parts of the globe make trips to the park for viewing its unique wildlife and biodiversity. The tourist inflow pressure in the park as well as revenue collection increases day by day and it is shown in Table 3.5. If all the visitors are divided into two different groups, i.e. Indians and foreigners, then from this Table it is found that Indian tourist inflow to the park increases in a high speed, but number of foreign visitors increase in a decreasing rate.

Table 3.5 No. of Visitors Visiting KNP and Revenue Collection

Year	Number of Visitors per Annum			Revenue Collection per annum in Rs.
	Indian	Foreigner	Total	
2000-01	50498	1838	52336	30,38,258.00
2001-02	44162	2144	46306	34,94,084.00
2002-03	59811	2055	61866	53,60,425.00
2003-04	57864	3773	61637	61,38,657.00
2004-05	68412	5144	73559	66,75,037.00
2005-06	49116	5210	54326	76,15,169.00
2006-07	67968	5748	73716	79,80,949.00
2007-08	53640	6106	59746	87,34,185.00
2008-09	100284	5767	106051	1,12,20,698.00
2009-10	105264	7580	112844	1,21,67,974.00

Source: Forest Department, KNP

Kaziranga National Park is opened for visitors only for six months, i.e., mid October to mid March in a particular year because flood of Brahmaputra River captures most of the areas of KNP. The tourists use elephant safari and zip safari for viewing its unique wildlife and biodiversity.

3.5 Management of Wildlife in Kaziranga National Park (KNP)

Conservation and protection of unique wild animals of the park are the main objectives of establishment of Kaziranga National Park. Wildlife management has mainly two components and they are as follows:

3.5.1 Anti Poaching Activities

3.5.2 Habitat Manipulation

3.5.1 Anti Poaching Activities are those activities of the Forest Department of KNP to counter the threat of organized gangs of poachers in the park. Poaching activities in the National Park have increased in a rapid pace between the period of 1980 to late 1990s and it is still going on. In 1992, 48 rhinoceros are killed by poachers in KNP (Forest Department, KNP). To reduce these anti conservation activities of the park, anti poaching activities are strengthened both inside and outside the park by the park authority. The present figure of armed men and staffs has risen to 121 in anti poaching activities. During the current period poaching is declined substantially in the park, but to continue this process efficiency of the anti poaching camps' staff should raised and it requires resources in the form of man power, logistic support to the camp, mobility of

staff, infrastructures (buildings, roads, patrolling paths), modern arms and immunities, etc. The present strength of the anti poaching camps is highly inadequate as compared to area of the park.

3.5.2 Habitat Manipulation is those activities of the Forest Department to maintain the grassland, forests and wet lands of the park to provide a suitable habitat for the wild animals. It is also an important aspect of management of the park. Every year the grasslands of the park are burned by official staffs of the Forest Department to maintain the present stage of grassland by discouraging the growth of tree sapling. Some highlands have been constructed inside the park to facilitate shelter to the wild animals during the flood. The growth of various types of weeds like Mikenia, Mimosa and Eichhornia, causes degradation of wildlife habitat in the park. In the recent past various efforts have been carried out to remove mimosa and water hyacinth, etc.

3.6 Management Constraints

Protection and conservation of wild animals is the prime objective of the development of Kaziranga as National Park and this objective is achieved to a great extent in KNP during the last one hundred years. But some constraints stands in front of the management strategies of the park, some of which are natural and some are human created.

3.6.1 Flood

Flood is necessary and beneficial for maintaining ecology of grassland and forests. The gradual rising of the water level and quick recession is undoubtedly beneficial but

floods of severe intensity which covers the entire park for a prolonged period deprive the animals from food and shelter. Since last decade the increasing level of multi wave floods (mainly 1987, 1988, 1998 and 2012) are really destroying the wildlife of KNP or threatening the future of the Park. Due to various reasons, mainly deforestation in the upper catchments area of the Brahmaputra, the intensity of the flood is continuously rising. During flood most of the animals including rhinos have to migrate from the park and take shelter on the adjacent high grounds in Karbi Anglong Hills or wherever they may find shelter. During the last 50 years large scale habitat changes in the Karbi plateau include conversion to tea gardens, human settlement, logging and *jhum* (shifting agriculture). One impact is that the gap between the park and the plateau is increasing and suitable habitat of the wildlife is destroyed. Protection of wild animals in these areas is very difficult because enforcement network is almost zero and many animals lose their lives by poaching.

3.6.2 37th National Highway

The 54 km length of the 37th National Highway running parallel on the southern boundary of Kaziranga, divides the park between the low-lying grasslands in the north and the elevated Karbi Anglong hills in the south. During rainy season the animals migrate from the low laying grassland to the hills using ancient wild animal corridors and they have crossed the 37th National Highway, when much of the park is flooded by the Brahmaputra. Many wild animals are killed by vehicles while attempting to cross the Highway.

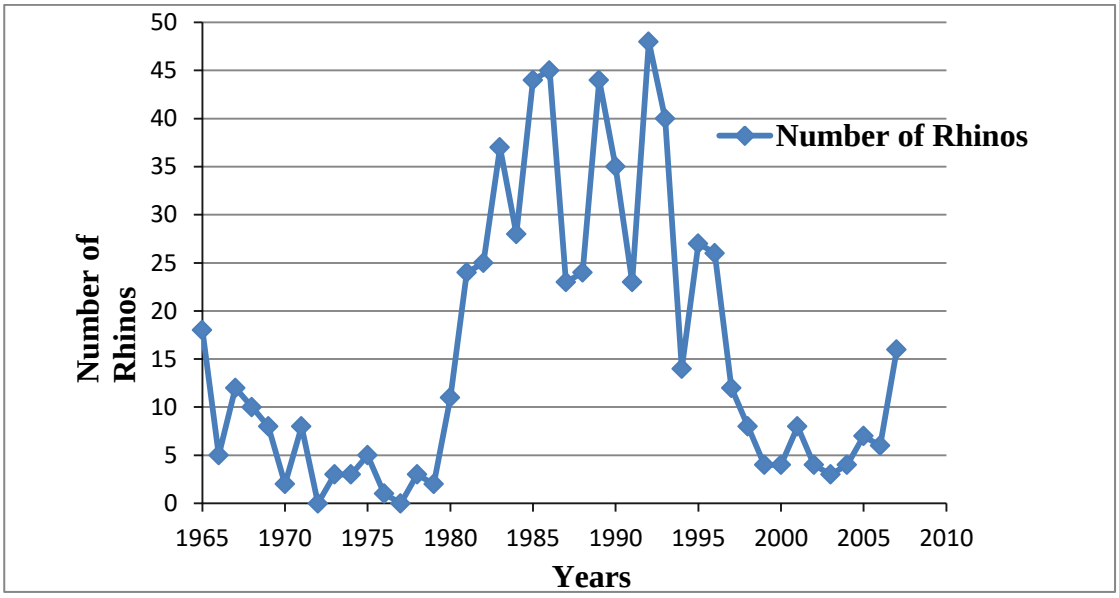
3.6.3 Erosion

Almost every year Kaziranga National Park hits by floods and river bank erosion of Brahmaputra River. On the other hand it also helps in huge accretion in the form of large and small river islands and these islands are suitable for rhino habitation. By taking into account the last thirty years remote sensing data on erosion and accretion, present area of the park is 408 sq. km. and during the same period population of the wild animals have increased manifold. So to sustain the growth of these wild animals for a long period of time, Government took steps to increase the area of the park and added newer areas under the park boundary. In the six Additions, some of the river islands of Brahmaputra River and some part of Mikir Hills are included in the park boundary. But, the management staff or strength is not increased in the same pace as compared to the increase in area of KNP.

3.6.4 Poaching of Wild Animals especially Rhinos

Poaching of wild animals especially rhinos is a great threat to KNP and it is continuously going on because of superstitious believes of people regarding aphrodisiac and medicinal value of rhinoceros horn. Highest numbers of rhinos are killed by poachers in KNP during the period of 1980 to late 1990s and it is still going on. In 1992, 48 rhinos are killed by poachers in the park (Forest Department, KNP). The numbers of rhinos lost their lives due to poaching during the period of 1965 to 2005 are shown in Figure 3.3.

Figure 3.3 Number of Rhinos Lost their Lives due to Poaching in KNP



Source: Forest Department, KNP

In 2010, altogether 68 rhinos, 11 elephants and 5 tigers had died for various reasons in the park (Forest Department, KNP). The main reasons are poaching of wild animals, unregulated tourism infrastructure, road mishap, flood, establishment of tea gardens, shifting cultivation, human settlement etc.

3.6.5 Habitat Degradation

Almost every year Kaziranga National Park hits by flood and as a result of these floods several water bodies or beels in the park have shrunk in size due to siltation. Another consequent of flood is that deposition of sands on the lands of the park which are covered by short grasses and so the suitability of these lands for the growth of herbivores reduces day by day. The growth of weeds like water hyacinth in water bodies and mikenia, mimosa in prime grassy areas is also a serious threat to Kaziranga National Park.

3.6.6 Crop Raiding

There are 23 villages and four tea gardens bordering the park, with another 30 villages close by; the total population in the immediate area of the park is about 70,000 according to the 2001 census report. Most of these people are poor and mainly depend on agriculture for living. Most of the agricultural activities of these people are carried out by plough animals. Wild animals of the park come out to the paddy fields frequently in search of food and destroy the crops and sometimes their plough animals are killed by predators. This makes them poorer.

3.6.7 Shortage of Staff and Infrastructure

The existing sanctioned strength of staff for management of KNP is 562 and it is running short by 71 positions lying vacant (Forest Department, 2011).

Table 3.6 Total Costs in Paying Salaries to Forest Department, KNP

Year	Total Salary of the Forest Department, KNP per annum (in Rs.)
2005-06	4,00,25,520.00
2006-07	4,79,41,060.00
2007-08	5,12,37,710.00
2008-09	5,43,10,000.00
2009-10	6,06,70,000.00

Source: Director Office, KNP

The costs of the Government for employing these staffs or salaries are shown in Table 3.6 and it is found that costs of this department increases as passes of time. More areas are added to KNP for management purposes, but management officials are not employed in the same pace as the additions of land to the park for effective control over the additional areas. Otherwise it will increase the poaching activities in KNP.

3.6.8 Haphazard Growth of Hospitality Industry

Unregulated tourism industry in the Kaziranga National Park creates many problems in pursuing the main objective of the establishment of the National Park. There are four National Parks and nine Wildlife Sanctuaries are established and developed in Assam to preserve the wildlife and biodiversity of the area. But KNP has been suffering from over-exposure in these years as compared to the other National Parks and Sanctuaries of Assam. The tourist inflow data of the last two years shows that more than 0.1 million visitors visit the KNP per year, but in the other parks and sanctuaries the tourists inflow pressure is less than 0.05 million per annum. In the southern part of the Kaziranga National Park, almost seventy numbers of hotels and lodges (out of these there are only four numbers of Government lodges) are constructed and giving services to the visitors of the park but most of the hotels and lodges are not owned by the local people. The haphazard growth of tourism related infrastructure, especially unchecked expansion of the hospitality industry, is blocking traditional animal corridors day by day. The focus should remain on the core aspect of the establishment of the park not on other aspects like construction of hotels and lodges to accommodate more tourists to keep the Kaziranga as a haven for wild-life. So there is an urgent need for a strategic shift of

policy on the part of the Tourism and Forest departments so that a segment of the tourist inflow is converted towards other parks and sanctuaries to lessen the pressure on KNP.

3.6.9 Establishment of Tea Gardens

There are four tea gardens are developed close to the park boundaries, which also create a threat to the preservation of the wild life through pesticide and fertilizer run-off.

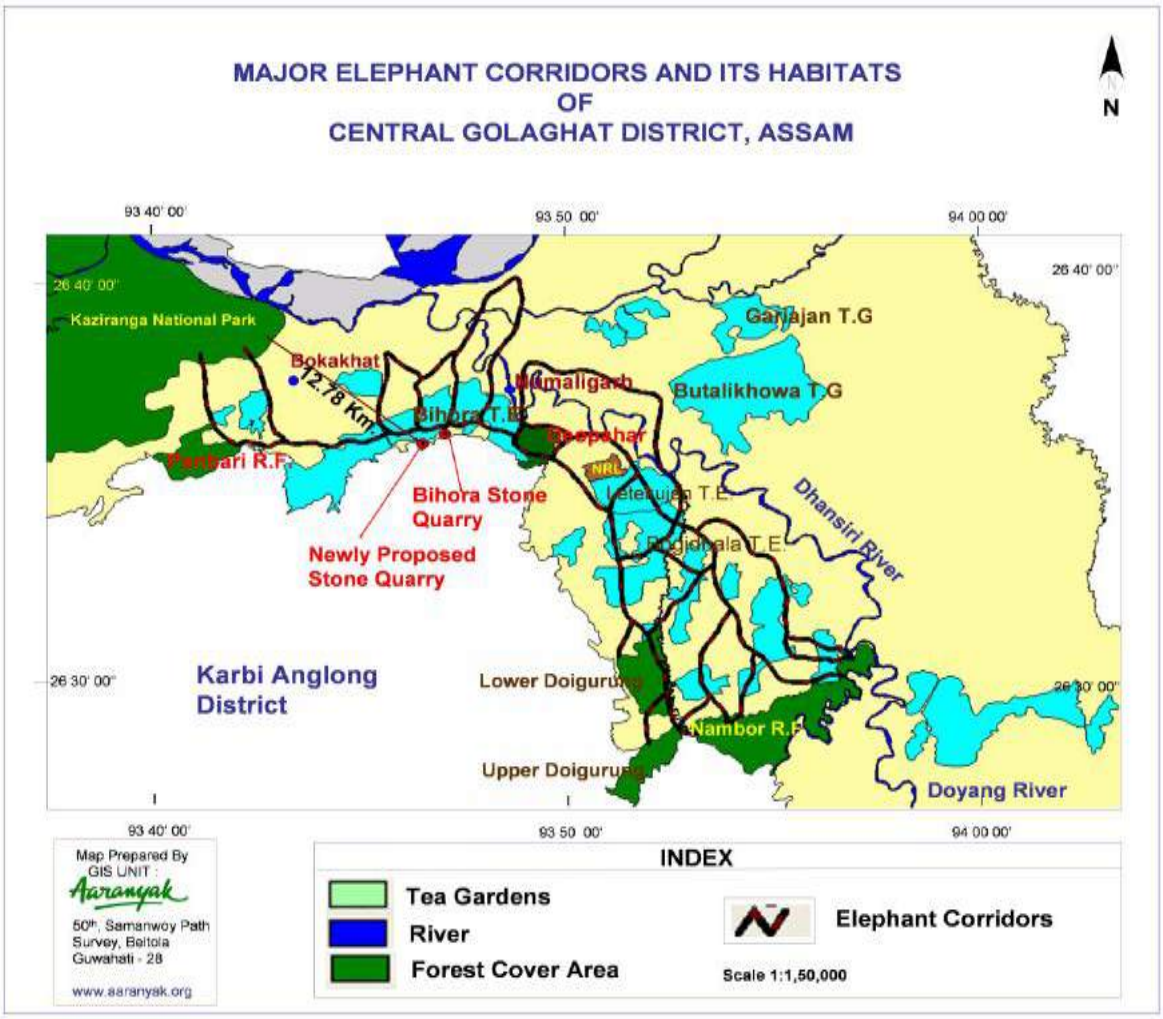
3.6.10 Degradation of Ancient Elephant Corridors

The wild animals (e.g. elephant) generally use the same corridors or paths to move from one place to another. The elephant corridors in the periphery of KNP are shown in Figure 3.4. The destruction of these corridors is increased continuously because of various reasons such as human settlement, development of stone quarries, establishment of refinery, etc. Destruction of these corridors due to the establishment of stone quarries and refinery are shown in Figure 3.4 and it increases the man-elephant conflict in the periphery of KNP.

3.6.11 Establishment of Numaligarh Oil Refinery

One oil refinery was established and developed in Numaligarh, but its position creates various problems because it is established in the upstream of Dhansiri River and its oil exploration activities threat the ecosystem of KNP.

Figure 3.4 Elephant Corridors in the Periphery of KNP



Source: Talukdar, et al, 2005

3.6.12 Dependency of Local People on KNP

Most of the local people lives in the periphery of KNP are poor and many of them are dependent on KNP for fire wood and fishing, but these are illegal activities. These activities of the local people threat the ecosystem and biodiversity of KNP.

3.6.13 Irregular Payment of Salaries

Forest guards, who are engaged in anti poaching activities, are not well equipped with modern arms and immunities. They also do not get their salaries regularly. In 2011 many of the home guards who are appointed as forest guards temporarily in the park are leaving their jobs because they do not get their salaries for five-six months.

3.7 NGOs in Kaziranga National Park

Kaziranga National Park is mainly managed by the Government, but various NGOs are come into existence in KNP for helping the Government in protection and conservation activities of the park. According to World Bank, "Private organizations that pursue activities to relieve suffering, promote the interests of the poor, protect the environment, provide basic social services, or undertake community development". The socio-ecological NGOs, which are mainly engaged in the field of environmental protection and conservation of wildlife, came into existence in India as well as in Assam since 1970s. The local, regional, national and even international NGOs are emerged and played an excellent role in conservation activities of KNP. Some of the NGOs have emerged and providing various services in KNP are- Environment Investigation Agency (EIA), Aaranyak, Kaziranga Wildlife Society (KWS), World Wildlife Fund (WWF)-India, International Union for Conservation of Nature (IUCN), Asiatic Society, Green Horn Society, Wildlife Trust of India (WTI), Wild Grass, Kaziranga, The Bombay Natural Historical Society (BNHS), Wildlife Preservation Eastern Region, The Rhino Foundation for Nature, Nature's Beckon of Assam etc. They are performing various

types of activities with the help of the Government in KNP, like- providing facilities to the tourists, organizing health camps, protecting its wildlife, raising the environmental awareness among local people, environmental monitoring; promoting environmental education, training and capacity-building; initiating and implementing various projects, conducting advocacy work in partnership with the government. They are also providing all kind of medical facilities to the wild animals of the park and post flood management of these animals. They have carried out various research and surveys in KNP and based on these researches various specific environmental and wildlife related issues are highlighted and carried out various campaigns. They are giving services against all kind of illegal trade related with wild animals and also help in anti poaching activities. NGOs are organizing various programs, workshops, meetings, melas, exhibitions and vaccination programs to raise the awareness of the local people regarding environmental protection and conservation of wildlife and biodiversity of KNP. Census of one horned Indian rhinoceros in KNP was conducted by the Assam Forest Department in collaboration with Asian Rhino Specialist Group and with support from Aaranyak, International Rhino Foundation and WWF AREAS program in the year 2009.

3.8 Pictures of Kaziranga National Park

Some pictures of KNP are shown in Fig 3.5 to Fig 3.10 to get a clear picture of the real problems facing by the wild animals of the national park.

Fig 3.5 Some Deer Crossing the NH-37 at the Kaziranga National Park

Fig 3.6 A dead Deer on NH-37 at KNP

Fig 3.7 A Herd of Elephants taking Shelter in High Grounds during Flood in KNP

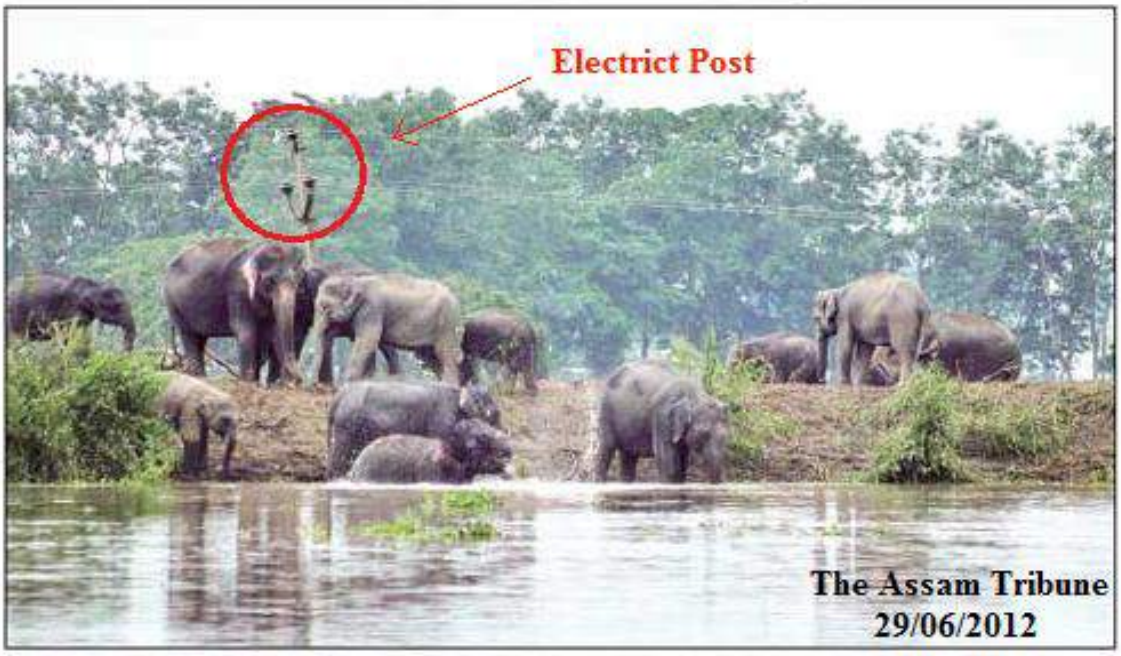


Fig. 3.8 A Deer on the Roof of a House during Flood in KNP

Fig 3.9 A Rhino without its Horn

Fig 3.10 Vehicles Passing through the Flooded NH-37 near KNP

Chapter 4

4.1 Introduction

Research methodology is a way to systematically solve the research problem. It discusses not only the research methods but also the logic behind of using particular methods in a research study. So that results of a research work are capable of being evaluated either by the researcher himself or by others.

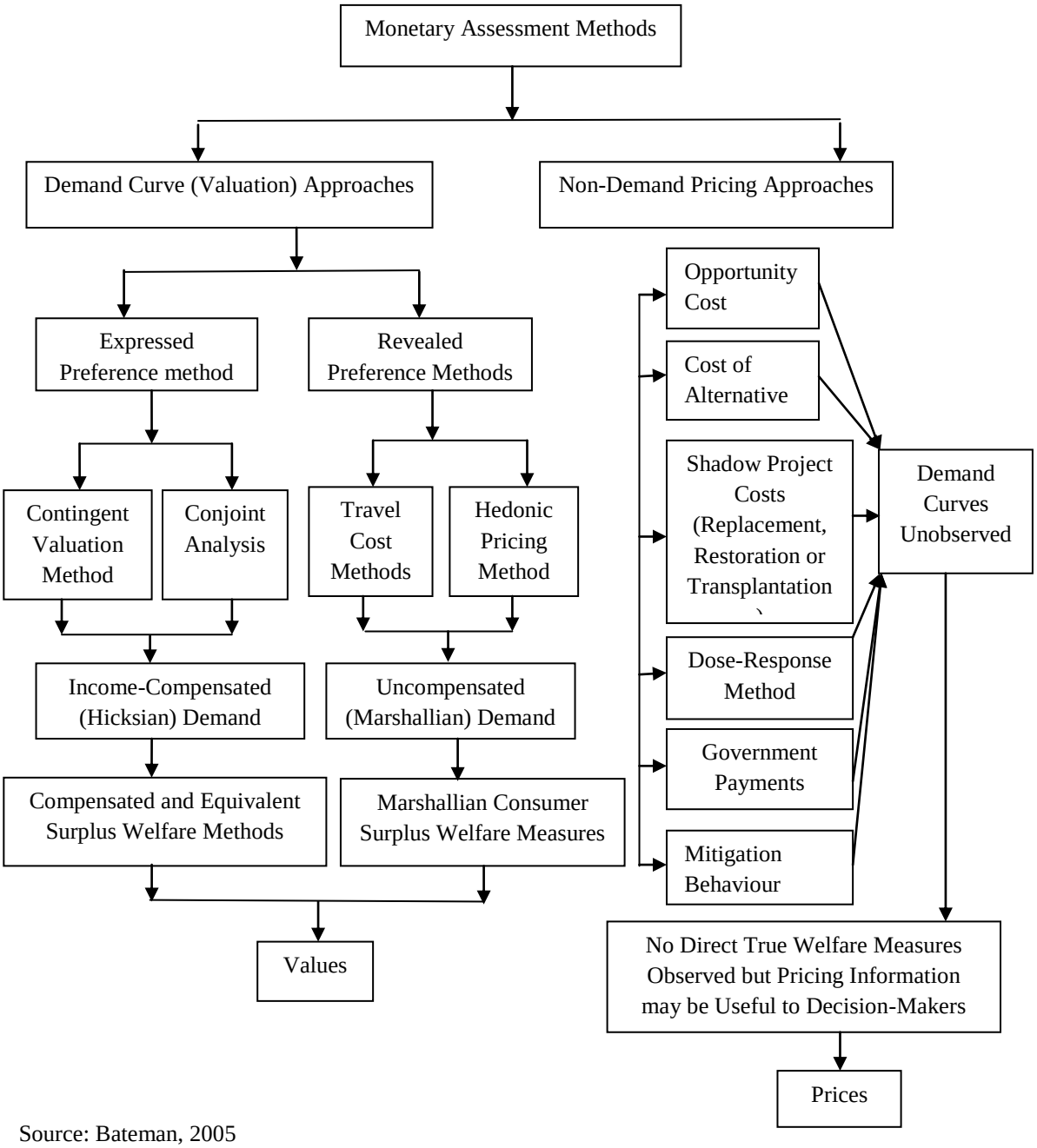
In this chapter, various non-market valuation techniques are discussed in detail and also discuss about the reasons behind the selection of zonal travel cost method (ZTCM) and contingent valuation methods (CVM) to estimate the recreational value of Kaziranga National Park. Survey design and sampling procedure of the present study is also explained in this chapter.

4.2 Methods of Non-Market Valuation

Environmental economics is a new multidisciplinary subject of enquiry. The discipline has indulged in a vigorous process of melding theory and practice providing solutions to a number of environmental problems such as global warming, biodiversity depletion, etc. Right from the beginning, one of the most thrilling concerns of environmental economics has been the problem of (e)valuation. With the emergence of sustainable

development concept in the human economy, the issue of valuation of environmental resources and services surfaced as the central question.

Figure 4.1 Methods for the Monetary Assessment of Non-market and Environmental Goods



Source: Bateman, 2005

There are various methods to the monetary evaluation of environmental preferences which are shown in Figure 4.1. This comprises the formal 'valuation'/demand curve methods and ad hoc environmental 'pricing' techniques (Bateman, 1999). In theoretical terms valuation and pricing approaches are quite distinct. The former are based upon individuals' preferences and conventional, neoclassical, welfare measures (hence the term 'valuation methods'), but the pricing techniques are much more akin to market price observations. For example, the shadow project pricing approach uses the costs of hypothetical environmental asset replacement, restoration or transplantation schemes to yield prices for the environmental costs of a proposed project. Such methods provide useful information regarding appraisal of projects, policies or courses of action.

Pricing techniques reflect the cost of protecting or providing environmental assets but not the benefits of doing so. In considering only prices rather than values, decision-makers are in danger of making incorrect choices. Therefore the Cost-Benefit Analysis (CBA) is insufficient for valuing environmental assets because it assessed all costs and benefits of a project only in monetary terms. Therefore use of pricing techniques is rejected and considers more theoretically rigorous valuation methods.

Valuation methods are ultimately relying upon individual preferences. These are usually divided into two approaches - direct methods and indirect methods.

4.2.1 Direct Methods of Valuation

Direct methods are based upon expressed preferences elicited through questionnaire surveys. These methods seek to infer individuals' preferences for environmental quality directly, by asking them to state their preferences for the change in environmental quality.

(A) Contingent Valuation Method

The contingent valuation method (CVM) was first used by Davis (1963) in a study of hunters in Maine for the valuation of environmental goods. Since mid-1970s, the method has become the most widely used and most controversial of all environmental valuation techniques. Carson (1991) describes six main components to a successful CVM study:

1. Define the Hypothetical Market Scenario

In the first stage, a hypothetical or contingent market is set up in which individuals are simply asked how much they are either willingness to pay (WTP) or willingness to accept (WTA) in respect of the proposed change in provision of the good under investigation. The market scenario is the information to be conveyed to a respondent, to place the respondent in the right frame of mind to give meaningful responses to questions.

One of the first decisions to make is how to define the good to be valued. If a beach has been harmed by an oil spill, then what environmental good should be valued which may be a day at the beach, the view of the beach, a degraded beach or water pollution.

It is also important to describe the context within which the good is supplied. If it is a day at the beach, how payment would be made and it may be an admission fee or a parking fee.

It is important that the description of the market in a realistic manner to the respondent and at the same time true to the eventual economic model which will be used to analyze the collected data. If the market scenario is not understandable and believable to the respondent, the data will give robust results.

The payment mechanism is also an important issue in constructing the market scenario. The market scenario must be rooted in real-world experience, including the payment vehicle. Thus if the good is avoiding an oil spill at a beach, then a believable payment vehicle might be a tax on gasoline to hire additional checkers for oil tankers. It is also important to avoid a scenario that irritates respondent's notion of right and wrong.

It is also important to provide a right context for the survey. For example, in valuing cleaner groundwater, most people know very little about groundwater. So that to get meaningful responses to questions on this topic, some information will probably needs to be provided to respondents. Obviously, tie and other constraints allow very little education of respondents in the course of administering a survey. This raises the question of bias introduced by incompletely or inaccurately "educating" the respondent.

The NOAA (The U.S. National Oceanic and Atmospheric Administration) Panel makes several recommendations regarding the market scenario. One point they make is that respondents should be reminded that substitutes exist. For instance, in ascertaining the value of a national park in India unhygienic by growing human settlement in the parks geographical area, the respondents should be reminded that there are many unpolluted national parks in India. The Panel suggests that the survey should be designed to avoid generating spurious emotions, such as a dislike of "big business". The Panel also urges that there be checks within the questionnaire to be sure that the respondent understands and accepts the information in the survey.

2. Choosing Elicitation Method

After properly defining the market scenario, the next step is to decide how best to obtain the valuation response. This is obviously a very important part of the survey and one of the most difficult to administer effectively. There are four primary ways of eliciting value: (i) open-ended (OE), in which the respondent is asked 'how much are you willing to pay?' for preservation or conservation of environmental resources, (ii) dichotomous choice (DC), where respondents are asked 'are you willing to pay Rs. X?', the amount X being systematically varied across the sample to test individuals' responses to different bid levels. This approach produces a discrete bid response variable and may be iterated using higher or lower bid amounts depending upon the respondents' replies to previous amounts; (iii) iterative bidding (IB), in which a series of DC-type questions are followed by a final OE question; (iv) payment card (PC), in

which respondents select their maximum WTP amount from a list of possible sums presented on a card to them.

The dichotomous choice (DC) or referendum approach is recommended by the NOAA Panel because they thought it minimizes possible bias and is also familiar to the respondents who often vote yes/no on public decision making process. One problem with referenda is that more data are needed to obtain statistically significant results and this raise the cost of the survey.

It is assumed in DC framework that representative individual knows their own preferences, but these are not completely observable by a researcher. Utility function of an individual can be expressed as $U=U(Q_j, y, x)$, where Q is the level of environmental quality, y is income (and all other goods) and x is a vector of socioeconomic characteristics, is only partly observable by researcher. Let us assume that environmental quality improves from $j = 0$ to $j = 1$.

The utility function takes the following form:

$$v = (Q_j, y, x) + \varepsilon_j \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \text{(4.1)}$$

where, ε_j is an identically and randomly distributed error with zero mean. Now it is assumed that the individual is asked if he/she would pay an amount A for the environmental improvement. The probability of accepting this offer (i.e., say 'yes') is:

$$Pr[yes] = Pr[\{v(Q_1, y - A, x) + \varepsilon_1\} \geq \{v(Q_0, y, x) + \varepsilon_0\}] \ldots\ldots\ldots \text{(4.2)}$$

And the probability of saying 'no' is {1-(*Pr*[*yes*])}. Equation (4.2) can be estimated statistically by first rewriting it as:

$$\Pr[\varepsilon_0 - \varepsilon_1] \leq [\{v(Q_1, y - A, x)\} - v(Q_0, y, x)] \quad \ldots\ldots\ldots\ldots \quad (4.3)$$

Assuming that Δv as the change in the observable part of the utility function, and η as (ε_1-ε_0), and F_η as the cumulative distribution function of the error. Then one can write:

$$\Pr[\eta \leq \Delta v] = F_\eta(\Delta v)$$

which, if $F_\eta(\Delta v)$ is assumed to have a logistic cumulative density function (as is often the case in empirical work), is equal to $(1+e^{-\Delta v})^{-1}$. In order to proceed, a specific functional form for v(.) must be adopted; v may be simplified into the form $v=(\alpha + \beta y)$, with the change in utility determined by the change in this over the two states and the offer price *A*. Suppressing *x* in this case, it looks like

$$\Delta v = (\alpha_1 - \alpha_0) - \beta A$$

where the α and β terms will depend on *x* and the probability of a yes response is:

$$\Pr(yes) = F_\eta[\alpha_1 - \alpha_0) - \beta A]$$

Alternatively, if $v=\alpha + \beta \log y$, then the Δv is roughly equal to $(\alpha_0-\alpha_1)-\beta(A/Y)$.

Utility-theoretic willingness to pay (WTP) measures is calculated by Hanemann from these models. It is assumed that WTP and it is distributed according to the function G_w. Mean WTP is estimated by the integral:

$$mean\ WTP = \int_0^T [1 - G_w] dA \ldots\ldots\ldots\ldots\ldots\ldots (4.4)$$

where *T* is some upper limit, infinite for a true mean or some upper value for a truncated mean.

Bishop and Heberlein (1979) formulated a model in which the probability that a respondent will say 'yes' to the offer price *A* is expressed as:

$$\Pr[yes] = [1 + e^{-\alpha - \beta logA}]^{-1} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (4.5)$$

Where α is the (α_1-α_0) term above. It implies that WTP has a log-logistic distribution, which is everywhere positive and positively skewed. Median WTP can be calculated as exp-(α/β); mean WTP must be evaluated by numerically integrating under the logistic function (4.5) between specified upper and lower bounds.

3. Design Market Administration

Having design the survey, it must be administered, i.e., complete the survey and respondents responses are assembled. There are three basic approaches to survey administration: mail, telephone and in-person.

Mail surveys are the cheapest to administer, although they have problems. One problem is nonresponse. A mail survey is considered a success if only 30% of the surveys are not returned. Another problem with mail surveys is that the respondent needs to understand the survey instrument. Therefore the survey must be relatively simple.

Telephone surveys are also relatively inexpensive to administer. However, telephone must be widely available within the population being surveyed. There may also be bias in terms of who answers the telephone call. For example, unemployed people may be more likely to be available. Another problem with telephone surveys is that visual cues cannot be used (e.g., photographs). This may lead to problems in eliciting values regarding changes in environmental quality, since photos are often used to express the nature of the changed quality.

In-person surveys are the most expensive to administer but can be the most reliable. The NOAA Panel recommends the in-person surveys to collect the data in a CV type study. One problem with an in-person survey is interviewer bias. It is difficult for an interviewer to always appear neutral when conducting an interview. Furthermore, since environmental goods are often perceived as desirable and socially "correct", respondents may be reluctant to reveal their unwillingness to pay if in fact they do not view the environment as very important (in the words of the NOAA Panel, "social desirability bias").

Another issue in market administration is pre-testing of the survey. The NOAA Panel emphasizes the importance of exhaustive pre-testing of the survey instrument before the actual survey is conducted. This would include very careful analysis of the wording of each question and the organization of the survey. The survey can then be administered to test groups and adjusted based on feedback.

4. Sample Design

There are two issues in choosing the people to answer the CV questionnaire. The first is to choose the group or population from which the sample is to be drawn and second is to draw the random sample.

5. Experimental Design

The goal of a CV survey is to develop statistically significant estimates of willingness to pay for a particular environmental good or to test a hypothesis about the willingness to pay for the hypothetical good. Considering the cost of data collection, it is important to construct a survey carefully so that appropriate information is collected in an efficient manner without unintentional biases. This is the process of experimental design.

6. Estimation of WTP Function

The last step is to take the survey results and correctly estimate the WTP function. This is obviously an important step. Sometimes this step is neglected until after the survey has been conducted, only to find that some vital piece of information is needed but was not collected on the survey. This outcome would suggest a defective experimental design.

(I) CVM Guidelines from the NOAA Panel:

In 1992, the U.S. Government decided that contingent valuation (CV) had become so important to its management of environmental resources that a high-level review was

needed on the validity of the CV method. The U.S. National Oceanic and Atmospheric Administration (NOAA) got the responsibility of writing regulations under the 1990 Oil Pollution Act, convened a panel of six distinguished economists (Robert Solow, Kenneth Arrow, Edward Leamer, Paul Portney, Roy Radnor and Howard Schuman) and survey researchers to evaluate the CV method. The NOAA panel concluded that CV could be useful, but certain practices would seem to be necessary to generate reliable estimates of willingness to pay. These recommendations had a significant influence on the results of a CV survey. The principal recommendations are as follows:

1. A dichotomous choice format should be used.

2. A minimum response rate from the target sample of 70% should be achieved.

3. In-person interviews should be employed (not mail shots), with some rule for telephone interviews in the piloting stages.

4. WTP, not WTAC, measures should be sought.

5. After excluding protest bids, a test should be made of whether WTP is sensitive to the level of environmental damage.

6. CVM results should be calibrated against experimental findings; otherwise a 50% discount should be applied to CVM results.

7. Respondents should be reminded of their budget constraints.

(II) Reliability Test of the CV Method:

Validity test is carried out to test the reliability of a CV study, since it is based on a hypothetical market situation. There are four means to ascertain the reliability of CVM results and they are (a) test-retest procedures, (b) convergent validity, (c) construct validity and (d) temporal stability test.

(a) Test-retest procedures involve conducting a CVM study on a particular resource change and population of gainers/losers, then repeating the same CVM study on the same sample from the same population some time (a few months, in most cases) later. Results from the two samples are then compared for statistically significant differences. For example, Loomis (1989) found no significant difference in CVM estimates of WTP to improve water quality in Mono Lake, in the Sierra Nevada Mountains, when he resurveyed the original sample after a lapse of nine months. Test-retest correlations were higher for open-ended questions than for DC questions.

(b) Convergent validity checks compare CVM estimates for a particular environmental good with estimates gained from other valuation methods such as the travel cost or hedonic price models. If a CVM study gives a result similar to a hedonic price or travel cost study, then at least the analysis is converging on one answer. Whether this is the correct answer may be unknowable but, without a reason to believe that the two methods should be converging on some other magnitude, it is reasonable to take the convergence of any two methods on the value of a given good as a desirable sign. However, defining convergence can itself be difficult. Many decisions must be

made in the course of implementing any one of the methods, and the fact that there are cases where the correct choice is unknown means that more than one estimates is available from each technique. This makes comparisons vague. Sampling, data analysis and survey instrument design all introduce possible bias and error into the calculation of a WTP amount. Authors engaged in convergent validity studies have therefore sought to find estimates which come within some specified or implicit bounds of other estimates. These comparisons can be made in two ways. First, one can compare the actual estimates as ratios or differences. Second, one can look at the correlation between estimates based on different techniques. In the last three decades, this test is most widely used by the researchers.

(c) Construct validity examines the consistency of CVM results with the predictions of economic theory.

(d) Temporal Stability compares the CVM estimates of two different samples which are collected from the same population using the same survey instrument at two different points in time.

(III) The CVM-X Method:

The CVM-X method is another promising way of increasing reliability of CVM estimates. Shogren (1993) introduced the idea of CVM-X method. The idea behind CVM-X is that it could be a cost-effective tool that combines the advantages of CVM and experimental auction markets by increasing the validity and accuracy of surveys while broadening the scope of non-market valuation in the lab. CVM-X consists of four

basic steps. First, researchers run a CVM survey and elicit hypothetical values for the good in question. Second, the researchers bring sub-samples of the CVM respondents into the lab and elicit real bids for the actual good in an incentive-compatible auction that employs real goods, real money and repeated market experience. Experimental markets provide people with a well-defined incentive structure that enables the researcher to elicit more accurately the value of a non-market good, product or process. Third, estimate a calibration function relating the auction market bids of the sub-sample of their hypothetical bids (and other factors if appropriate). Fourth, use the estimated calibration function to adjust the values of CVM respondents who did not participate in the laboratory auction. Implicit in CVM-X is a test of validity since it can be directly compare hypothetical bids with those elicited under non-hypothetical conditions in the laboratory.

(IV) Problems of Contingent Valuation Method:

Contingent valuation (CV) is highly controversial. There are many problems that have been identified with CV. A primary criticism is that the values elicited in CV surveys are not based on real resource decisions- they are hypothetical. Many argue that without real resources at stake, the response to a WTP question is meaningless.

There is no budget constraint in a hypothetical survey and without a budget constraint, choices are meaningless.

Another problem with CV has been called embedding. A typical problem for a CV survey is to determine the value of a specific natural resource, such as a particular park.

However, there are usually substitute parks outside of the domain of the survey and there appear to be inconsistencies in how people value individual parks versus groups of parks. People may place the same value on cleaning up one lake as on cleaning up many lakes.

(B) Stated Preference Method

CVM is a stated preferences method in which individuals state their preferences (in terms of WTP or WTAC) for environmental goods, it is only one example of this more general approach. Stated preference can be considerably generalized to encompass situations where individuals are asked either to rank a list of environmental options i.e., the contingent ranking or else to choose between pairs of choices. These choices typically include attributes of the environmental good and cost of provision/access. These more general stated preference approaches have been pioneered by Adamowicz, Louviere and Williams (1994) with respect to environmental valuation and in the general economics field by McFadden (1974, 1986). In stated preference (SP) analysis, all possible attributes of the good in question are first identified and ways found of measuring these attributes. Then, from the set of all attributes and all possible values these attributes could take, a much smaller sub-set is chosen using statistical design techniques. Interaction terms between attributes are usually ignored, in order to keep the design problem manageable. Alternative scenarios, between which respondents must choose, are selected so that the attributes of interest are not collinear (are 'orthogonal'); this assists subsequent econometric analysis of choices.

4.2.2 Indirect Methods of Valuation

Indirect methods of valuation seek to estimates individuals' willingness to pay for environmental quality by observing their behavior in related markets and individuals preferences are revealed through purchases of market-priced allied goods.

(A) Travel Cost Method

This is one of the oldest approaches to environmental valuation, proposed in a letter from Harold Hotelling to the US Forest Service in the 1930s. It is first used by Wood and Trice in 1958 and popularized by Clawson and Knetsch (1966). The method involves using travel costs as a proxy for the price of visiting outdoor recreational sites. A statistical relationship between observed sites and the cost of visiting is derived and used as a surrogate demand curve from which consumer's surplus per visit-day can be measured (by integrating the area under this curve). Recent development of the technique allows the welfare effects of changing the characteristics of a site to be analyzed.

There are three major dimensions to travel cost analysis of the demand for an environmental good. One concerns how demand depends on quality of the good. A second is associated with the number and duration of trips during a period of time such as a year. A third concerns the treatment of substitute sites, such as when a visitor takes a decision on trip to a national park faces of several parks.

The travel cost method (TCM) assumes weak complementarities between the environmental asset and consumption expenditure. This implies that, when consumption expenditure is zero, the marginal utility of the public good is also zero. So if travelling to a forest becomes so expensive that no one goes any more, the marginal social cost of a decrease in the quality of that forest is also zero. Therefore TCM cannot estimate nonuser values. An implicit assumption made in most travel cost studies is that the representative visitor's utility function is 'separable' in the recreation activity being modeled. This means that, if the activity of interest is fishing, then the utility function is such that demand for fishing trips can be estimated independently of demand, for example, cinema trips.

(I) A Simple Model of a Single Site:

It is assumed that there is only one single consumer and a single environmental good, example a park. The park has a level of quality, q that may be associated with congestion or air quality (or anything else that affects the quality of a visit to the park). The consumer preferred higher qs. The consumer chooses two things- visits to the park (v) and a basket of market goods (x). Visit to the park over a fixed period of time is calculated here, say a year. It is also assumed that units in which x is measured are such that the price of x is unity. Assuming that p_o be the out-of-pocket expenses associated with a single trip to the park- automobile, train or plane expenses, food and admission charges. Suppose the consumer works for L hours at a wage w to earn a certain income. So the consumer's utility maximization problem is

$$\max_{x,v} U(x, v, q) \quad \text{..... (1)}$$

such that

$$wL = x + p_\sigma v \quad \text{..... (2)}$$

The only problem here is that out-of-pocket expenses are not the only cost of visiting the park. Consumers must take time to travel to or to visit the park. And this time could be devoted to work in order to increase their income. They have chosen not to work, but to visit the park. So it should be incorporated in the demand model.

It is assumed that consumer has *T* hours of time available to devote to park visits and work. Whatever portion of *T* is devoted to work, the rest will be devoted to park visits and vice versa. Denote by t_t and t_v, respectively, the travel time associated with a single round trip visit to the park and the on-site time associated with a single visit. The consumer then faces a time-budget constraint that must be affixed to the utility maximization problem in Eqs. (1) and (2)

$$T = L + (t_t + t_v)v \quad \text{..... (3)}$$

Equation (3) can be substituted into Eq. (2) to eliminate *L* and thus reduce the maximization problem to

$$\max_{x,v} U(x, v, q) \quad \text{..... (4)}$$

such that

$$xT = x + [p_0 + w(t_t + t_v)v$$

$$\equiv x + p_v v \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots.. (5)$$

where $$p_v = p_0 + w(t_t + t_v) \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (6)$$

Eq. (4) is a conventional utility maximization problem except that the price of a visit equals the out-of-pocket expenses plus the value of time devoted to the trip, with time valued at the wage rate. Since time spent traveling could alternatively be earning a wage, the opportunity cost of an hour of travel time is the wage, *w*. It is also logical that consumers would rather be traveling than working. Thus they may not view leisure time as totally interchangeable with labor tie. Further, they may not be able to earn additional money from wages, if their work hours per week are set by contract.

One can solve the maximization problem specified in Eq. (4) for a particular consumer. The result will be a demand function for visits to the park:

$$v = f(p_v, q, y) \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (7)$$

where *y* is income (*wT*). With the help of Eq. (7) we can measure the willingness to pay for a small change in q.

Figure 4.2 shows typical demand curves for park visits: the vertical axis is the full price of a park visit and the horizontal axis is number of visits (per year). There are two demand curves, one for quality level q_1 and for a slightly higher level of quality, $q_1 + \Delta q$. Clearly consumers like this quality increase since they are interested in

consuming more park visits for higher qs. At a price of a park visit of p*, the consumer demands v_1 visits at the lower quality level and $v_2 > v_1$ visits at the higher quality level. The consumer's willingness to pay for this increase in q is the increase in surplus associated with the quality increase- the area ABC. If Δq is very small, the area will be small; the ratio of the area of the region to the change in q, Δq, is the marginal willingness to pay for increases in q. If this exercise is repeated for a variety of quality levels, the marginal willingness to pay function for quality will be generated.

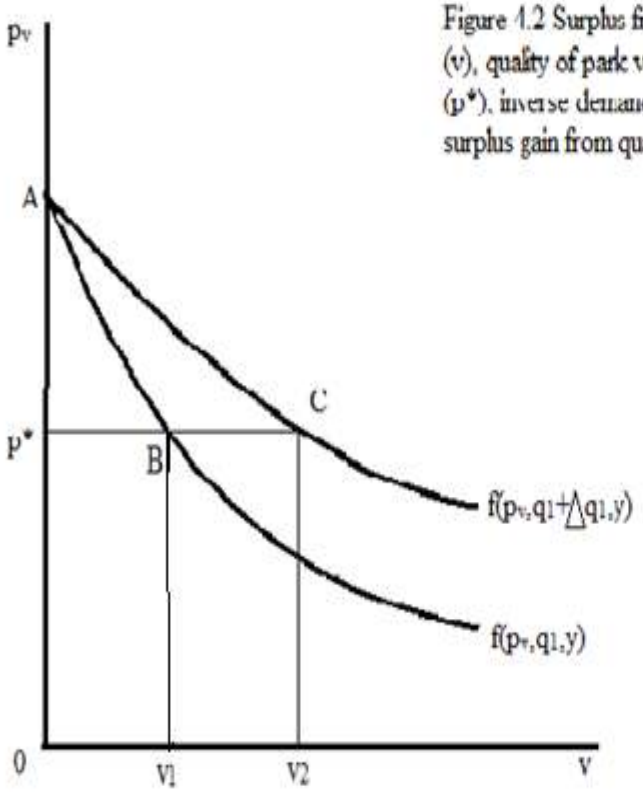


Figure 1.2 Surplus from a change in quality. Number of visits to the park (v), quality of park visit (q), price of a visit (p_v), actual price of park visit (p^*), inverse demand for park visits [$f(p_v,q,y)$], income (y) and ABC is surplus gain from quality increase from q1 to q1+△q1

(II) Implementation:

Real problems always arise when the theoretical models are used for empirical analysis. The travel cost model is no exception. There are two basic approaches to estimating the demand for a site based on travel costs. One method is suggested by Hotelling and is called the zonal travel cost model (ZTC), because of its use of geographic zones around the site as the basic units of observation. The second approach is more data intensive and more recent and is called the individual travel cost model (ITC), because of its reliance on observations of the behavior of individuals.

1. The Zonal Travel Cost Model

The zonal travel cost model follows directly from the original suggestion of Hotelling. However, the method was first applied and developed in detail by Marion Clawson and colleagues at Resources for the Future in the late 1950s and 1960s (Clawson and Knetsch, 1966). The only data that need be collected are a sample of visitors to the site in question, identifying the origin of those visitors' visits. Having identified the origin of visitors, it is possible to estimate the number of visitors per year from each origin "zone". Knowing the population of each origin zone gives a visitation rate for the zone (e.g., 1 person for every 1000 population). This visitation rate is explained by two things: the travel cost from the origin zone to the site (the "price" of visiting the site) and the demographic/income characteristics of the population of the origin zone. The researcher thereby generates a set of data, one data point for each zone, indicating the visitation rate, travel cost and characteristics of the zone.

The next step is to statistically determine how the visitation rate is affected by travel costs and zonal characteristics. By doing this it is possible to estimate how visitation will change if travel costs change, for instance, by applying an admission fee for the site. Choosing several admission fees and the resulting total attendance at the site generates points on a demand curve for the site.

To be more precise about this, let us take a park and assume the distribution of people and alternative sites is fixed in the geographic region from which the park draws visitors. Divide the region around the park into Z zones, with travel time roughly constant from any point within a zone to the park. Index these zones by $z = 1, \ldots, Z$. Let us assume the population of each zone be P_z and the average income in each zone, y_z. And also assume that w_z be other demographic characteristics of the zone, such as the fraction of young people in the population (anything that might influence making a trip to the park). Compute the travel cost for visiting the park for each zone, excluding any admission fee to the park and denoted this travel cost as π_z. Now assume that the admission fee is f (which is the same for all zones). Of course, f may be zero. Finally, take a survey of park visitors during a year to estimate the total number of visitors in a year(S) and the number of visitors from each zone, s_z. Define the visitation rate as v_z = s_z/P_z.

The next step is to statistically estimate a visitation equation:

$$v_z = g(\pi_z + f, y_z, w_z) \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots. (7)$$

This equation explains the visitation rate (akin to the probability that a randomly selected resident of the zone will visit the park) on the basis of the price of visiting the park ($\pi_z + f$), income(y_z) and other characteristics of the typical zone resident (w_z). Demand for park visits (q) can then be written in terms of the function g:

$$q(f) = \sum_z P_z \, g(\pi_z + f, y_z, w_z) \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (8)$$

Although in statistically estimating g, the admission fee (f) was at its actual value and now varying f and estimate how $q(f)$ changes, using Eq.(8). This is the aggregate demand curve for the park.

2. The Individual Travel Cost Model

One of the strengths of the zonal travel cost model is that it is not data intensive. One of its shortcomings is assuming all residents of a zone are the same (since only average zonal characteristics are used). An alternative is to collect more information on individual visitors and use those data in estimating a model of demand instead of zonal averages. This is how a very common approach to implementing the travel cost method; there are two primary problems with this method. One is that data are expensive to collect and the more data that are collected from an individual, the more expensive it is.

Another problem arises if the data used are generated by actual park visitors. The problem is bias introduced by the fact that the sample is self-selected, not a random sample of all possible visitors. Although it is possible in principle to correct for this self-selection, the problem does not arise if the entire population of potential visitors is

sampled. Unfortunately, it is generally too expensive to sample the entire population surrounding a park; a large sample size would be needed because most people will probably not visit the park. Large samples are more expensive than small samples.

(III) Problems of Travel Cost Method:

There are several problems associated with implementing the travel cost method. The most significant problem is in estimating the value of time. Many of the travel cost studies assumed that the opportunity cost of travel time is the wage rate that is generally not considered to be the case in actuality. Most people consider the opportunity cost of travel time to be substantially less than their wage rate. This may be because they like traveling more than working. Or it may be due to the fact that they receive a fixed wage and cannot adjust their hours worked, at the margin.

There have been many studies of the value of time spent in traveling. The primary use for such information is not for travel cost models of demand but rather for planning urban transportation systems. The typical approach to determining the value of travel time is to observe how individuals trade off their time with other expenses. For instance, if people willingly choose to save $1 by taking a bus rather than a train from point A to point B, thereby lengthening their journey by 15 minutes, we may conclude that they value their travel time at less than $4 per hour. The general consensus of the urban transportation economics literature appears to be that people value their travel time somewhere in the region of 20-50% of their gross wage rate (Bruzelius, 1979; Small, 1992).

Another problem with computing travel costs arises particularly in the case of automobiles. Is it appropriate to simply use the extra costs associated with the trip (which would typically exclude some depreciation, insurance and taxes) or should average costs of operating the vehicle be used?

Multi-point tourists create a problem in estimating the travel cost method. Usually it is accounted only that part of the total arrival cost of multi-point tourists which is incurred for this part of trip only. This is difficult since cost data may not be disaggregated in this way.

(B) Hedonic Pricing Method

The hedonic pricing approach derives from the characteristics theory of value first proposed by Lancaster (1966) and Rosen (1974). This seeks to explain the value of a commodity as a bundle of valuable characteristics. One or more of these characteristics may be environmental. For example, the value of a particular house may depend on the number of rooms, whether it has a garden and how close it is to the shops, but also on the noise level in the neighborhood and/or air quality levels. Other possible environmental variables include pleasant views, distance from toxic waste dumps or offensive smells from factories or farms. The hedonic price (HP) approach was first applied to environmental valuation by Ridker and Henning (1967) and proceeds through three stages. First, a hedonic price function is estimated; second, implicit prices are calculated for the environmental variable of interest and third, a demand curve for this variable may be estimated. The HP approach can only measure use values.

There are many problems associated with the HP approach and they are briefly as follows:

Firstly, if some independent variables that significantly affect the dependent variable, which is omitted from the HP equation and is also correlated with one of the included variables, then the coefficient on this included variable will be biased.

Secondly, some environmental variables (such as alternative air pollution indicators) may be highly collinear. This means that separate equations for each may need to be estimated; otherwise the implicit prices will be difficult to disentangle.

Thirdly, economic theory does not indicate any specific form which should be used for the HP equation. Thus which form will be used depends on econometric considerations and it also influences value of the estimated product.

4.3 Selection of Tools

Collection of data is one of the most important parts of a research work. The data serves as the bases or raw materials for analysis. Without an analysis of factual data, no specific inferences can be drawn on the question under study. The relevance, adequacy and reliability of data determine the quality of the findings of a study. Thus, the scientific process of measurement, analysis, testing and inferences depends on the availability of relevant data and their accuracy. So, in a research work, it is very much necessary to select reliable and valid tools of data collection very carefully to getting valid and reliable data.

To achieve the main objectives of the present study, both primary and secondary data are essential. The primary data are those which are collected afresh and for the first time, and thus happen to be original in character. On the other hand, the secondary data are those which have already been collected by someone else and which have already been passed through the statistical process. The necessary secondary data for the present study are collected from the Census Report of India. The primary data can be collected through various methods such as observation, interviewing, mailing, etc. In the present study, a face to face interview is carried out through a structured schedule to collect the necessary primary data, which are essential to attain the objectives of the present study, from the tourists of Kaziranga National Park (KNP). The interview schedule is divided into four different sections, which are as follows:

1. Section A: Personal information of the tourists,
2. Section B: Information regarding the trip to KNP,
3. Section C: Information relating to tour costs and composition and
4. Section D: Information on the Willingness to Pay of the Tourists.

1. Section A: Personal information of the tourists

Tourists or visitors of Kaziranga National Park (KNP) are the respondents of the present study. This section encloses information regarding socio-economic characteristics of the visitors of KNP, which are places of origin, age, sex, religion, educational qualification,

principal occupation, monthly household income, number of family members and number of earning member of the household.

The information regarding origin of the tourists are collected to divide all the sample tourists into different zones according to their places of origin and this data set is essential for application of the zonal travel cost method. Other socio-economic characteristics of the visitors are collected to know the effects of these variables on demand for visiting the park and willingness to pay for protection and conservation of KNP.

Educational qualification of the visitors is categorized into six different levels and these are as follows: (a) post-graduate and above, (b) graduate/polytechnic, (c) higher secondary, (d) secondary, (e) below secondary and (f) primary and illiterate.

Principal occupation of the visitors is classified into five different categories and these are as follows: (a) salaried employee, (b) self employed (own manufacturing/trading enterprise), (c) agriculture/fishery, (d) professional (doctor/consultant/lawyer, etc.) and (e) any other (house wife/ retired persons/student).

Monthly household income of the respondents is grouped into seven different levels, which are as follows: 0-10000, 10000-20000, 20000-50000, 50000-100000, 100000-200000, 200000-500000 and above 500000.

2. Section B: Information regarding the trip to KNP

This section includes information on the particular trip to KNP, which includes purpose of visiting the Kaziranga National Park, frequency of visiting the park, number of persons coming in the trip, willingness to visit again the park and experience of the trip.

Visitors are making trips to KNP for various purposes and in the present study these are labeled into five different categories, which are as follows: official, educational tour, viewing wildlife and biodiversity of the park, research/project and picnic.

The number of persons in a trip to KNP varies across the tourists. To show their preference pattern regarding number of persons in the trip to KNP, these are labeled into four groups and they are as follows: very small group (1-5), small group (6-10), medium group (11-15) and large group (above 15).

Tourists from various parts of the globe, make trips to the national park for viewing its unique wildlife and biodiversity. But all of them do not want to visit the park again because of various reasons such as money constraint, presence of substitute sites, high travel cost, etc. To know their decisions on willingness to visit again the park, a question is put forward to the visitors in the schedule in such a way that the answer will come in yes or no responses.

Visitors acquire various types of experiences in the trips to Kaziranga National Park and these experiences (like behavior and/or responses of the forest guards/officials and hotel staff, satisfaction level on getting view of wild animals, communication and

transportation facilities, etc.) make someone happy and someone unhappy. In the present study, these experiences of the visitors are grouped into two classes and they are as follows: (a) satisfied, and (b) not satisfied.

3. Section C: Information relating to tour costs and composition

This is a main part of the schedule. Information on duration of stay in KNP, means of transport used in the trip, total travel costs and total costs incurred locally in the national park, are included in this section. Travel costs comprise of all the costs of air tickets, bus tickets, train tickets, rented car, fooding and other miscellaneous costs during travel time. The local costs include all the costs on lodging and fooding in KNP, elephant and/or jip safari, buying local products and other miscellaneous costs incurred in the national park.

4. Section D: Information on the Willingness to Pay of the Tourists

It is also a core part of the schedule and this part of the interview schedule is designed to elicit tourist's willingness to pay (WTP) for preservation and protection of Kaziranga National Park. For that purpose at first a hypothetical market scenario is constructed and in this hypothetical scenario respondents are asked to state their WTP for preservation of KNP. The voluntary payment vehicle has been adopted as the mode of payment.

In this section, some information is provided to get more accurate or reliable WTP amount for maintenance of KNP. These informations are as follows:

(a) Income is inadequate and it has various other essential alternative uses,

(b) There are so many national parks and sanctuaries in Assam,

(c) KNP is the homeland of one horned Indian rhinoceros,

(d) KNP is facing various types of problems and these issues are only a few of them.

4.4 Processing of Data

The data, after collection, has to be processed in order to analyze and to draw conclusions. This is essential for scientific study and for making contemplated comparisons and analysis. Processing of data implies editing, coding and tabulation of collected data so that they are amenable to analysis.

(A) Editing

Editing of data is a process of examining the collected raw data to detect errors and omissions and to correct these when possible. It involves a careful examination of the completed questionnaires and/or schedules. Editing is done to assure that the data are accurate, consistent with uniformly entered, as completed as possible and have been well arranged to facilitate coding and tabulation. In the present study, all the 230 schedules are completely filled up because the researcher himself carried out the

interview in KNP and during the survey period all the completed schedules are also scrutinized one by one carefully.

(B) Coding

Coding refers to the process of assigning numerals or other symbols to put the responses into a limited number of categories or classes. In the present study, both quantitative and qualitative data are collected on the basis of extensive literature review and to measure the qualitative data in quantitative form, some numbers are assigned by using the process of coding.

Proper conceptualization of the variables is very much essential to get a suitable and meaningful result of an analysis. In this study, some variables/attributes of the interview schedule are coded with number and they are as follows:

(a) Origin of the respondents: Origin of the respondents shows the present address of the tourists before making trips to Kaziranga National Park. All the tourists are grouped into eight different classes according to their places of origin and they are coded as follows:

- 'Upper Assam' is coded as "1",
- 'Middle Assam' is coded as "2",
- 'Lower Assam' is coded as "3",
- 'South Assam' is coded as "4",

- ‘Other North Eastern States’ is coded as “5”,
- ‘West Bengal’ is coded as “6”,
- ‘Other States of India’ is coded as “7”, and
- ‘Foreign Countries’ is coded as “8”.

(b) ***Age:*** The variable ‘age’ indicates actual age of the tourists in years on the date of data collection. Twenty years above tourists are considered as respondent in the present study because respondents should understand the hypothetical market scenario and elicit their willingness to pay amount for preservation of KNP in contingent valuation method, express their trip costs, etc. Further age of all the respondents is grouped into six categories and they are coded as follows:

- ‘21-30’ is coded as “1”,
- ‘31-40’ is coded as “2”,
- ‘41-50’ is coded as “3”,
- ‘51-60’ is coded as “4”,
- ‘61-70’ is coded as “5”, and
- ‘71-80’ is coded as “6”.

(c) ***Sex:*** The variable ‘sex’ represents gender of the visitors. It includes both ‘male’ and ‘female’ respondents and it is coded as

- ‘Male’ is coded as “1”, and
- ‘Female’ is coded as “0”.

(d) Religion: It represents religion of the tourists. It is categorized into four groups and coded as follows:

- ✓ ‘Hindu’ is coded as “1”,
- ✓ ‘Muslim’ is coded as “2”,
- ✓ ‘Christian’ is coded as “3”, and
- ✓ ‘Buddhist’ is coded as “4”.

(e) Educational Qualification: It indicates educational level of the visitors of the park. Generally it has a great role in determining WTP amount, decisions regarding trips to KNP, etc. Educational qualification is grouped into six classes and they are coded as follows:

- ‘Post Graduate and Above’ is coded as “6”,
- ‘Graduate/Polytechnic’ is coded as “5”,
- ‘10+2 Pass’ is coded as “4”,
- ‘10^{th} Pass” is coded as “3”,
- ‘Below Secondary’ is coded as “2”, and

- ‘Primary and illiterate’ is coded as “1”.

(f) Principal Occupation: The variable ‘principal occupation’ shows main source of income of the visitors. It is classified into five different categories and coded as follows:

- ‘Salaried Employee’ is coded as “5”,
- ‘Self Employed’ is coded as “4”,
- ‘Agriculture/Fishery’ is coded as “3”,
- ‘Professional’ is coded as “2”, and
- ‘Others’ is coded as “1”.

(g) Household Income: It indicates monthly household income of the visitors. It is a vital factor in determining WTP amount, trips to KNP, etc. It is classified into seven groups for descriptive analysis part and coded as follows:

- ‘0-10000’ is coded as “1”,
- ‘10000-20000’, is coded as “2”,
- ‘20000-50000’ is coded as “3”,
- ‘50000-100000’ is coded as “4”,
- ‘100000-200000’ is coded as “5”,

- '200000-500000' is coded as "6", and
- 'Above 500000' is coded as "7".

In econometric part of analysis average of each income group represents the monthly household income of the particular individual.

(h) Purpose of Visit: Tourists make trips to KNP mainly for viewing its unique wildlife and biodiversity. But they visit the park for other purposes also (like official, educational trip, research/project, picnic, etc.) and all of these are coded as follows:

- 'official' is coded as "1",
- 'educational tour' is coded as "2",
- 'viewing wildlife and biodiversity' is coded as "3",
- 'research/project' is coded as "4", and
- 'picnic' is coded as "5".

(i) Experience of the Trip: Tourists accumulate numbers of experiences in the tour to KNP and some experiences make them happy and some make unhappy. Visitors are satisfied or unsatisfied by taking the trips to KNP for these happy/unhappy experiences and in the present study their experiences in the particular trip are coded as follows:

- 'satisfied' is coded as "1", and
- 'not satisfied' is coded as "0".

(j) Frequency of Visit: It indicates numbers of visits or making tours to KNP during the individual's whole past life. It is classified into three categories for analysis purposes and coded as

- 'first time' is coded as "1",
- 'second time' is coded as "2", and
- 'third time or more' is coded as "3".

(k) Duration of Stay in KNP: Visitors visit the world heritage site for various purposes and these purposes also determine their duration of stay in the park. The variable 'duration of stay' indicates numbers of days spent in KNP by the visitors. It is grouped into five classes and they are coded as follows:

- 'one day' is coded as "1",
- 'two days' is coded as "2",
- 'three days' is coded as "3",
- 'four days' is coded as "4", and
- 'five days and more' is coded as "5".

(l) Willingness To Pay (WTP): In the present study, tourists WTP is estimated using contingent valuation method (CVM) for preservation and protection of Kaziranga National Park (KNP). But all the tourists do not want to contribute, i.e., someone

contribute and someone do not, for maintenance of the park. Accordingly all the tourists can be subdivided into two groups on the basis of chances of willingness to pay for conservation of KNP and they are coded as follows:

- 'pay' is coded as "1", and
- 'not pay' is coded as "0".

(m) Willingness to Visit: Tourists willingness to visit again the park is determined by various factors, such as income of the respondent, distances between the park and home, quality of the park, existence of other eco-tourist destinations, etc. and all of them do not want to visit KNP once again. So, there are two groups of tourists: one group wants to visit the park once again and the other group does not and it is coded as follows:

- 'visit again' is coded as "1", and
- 'not visit again' is coded as "0".

(C) Tabulation

In a research work when a large number of raw data has been assembled, it is necessary to arrange the same in some kind of concise and logical order. This procedure is referred to as tabulation. Thus, tabulation is the process of summarizing raw data and displaying the same in compact form (i.e., in the form of statistical tables) for further analysis.

In the present study, socio-economic characteristics of the tourists are described and interpreted in tabular forms. The objectives of this study are also analyzed and interpreted using numbers of tables.

4.5 Survey Design and Sampling

In the present study, both primary and secondary data are used to estimate economic value of the park and collects information in three distinct sets. In the Kaziranga National Park, every visitor group must produce their entry permits at the checkpoint of the park. These permits contain number of visitors and places of origin (addresses). The study collects this data for all visitors between the second week of January (2011) and second week of February (2011) because these months are the peak season for visiting the park. The zonal distribution of the tourists for this particular period is shown in Table 4.1 and assuming that this zonal distribution is followed for the whole year. Using this zonal distribution of the tourists/visitors all the visitors of the park are divided into eight (8) different zones. When this work has been done, mainly two issues are taking care of and the issues are as follows: firstly, the zones are identified in a way such that information on zonal socio-economic statistics is available from secondary sources. Secondly, the number of zones are not be too many so that a 'zero visitations' appears in a zone and at the same time it is not be too few to limit the degree of freedom during estimation of TGF.

The second set of data is collected from the Census report, 2001 of India and it comprises of total zonal population.

Table 4.1 Zonal Distribution of the Visitors of KNP

Sl. No	Place of Origin of the Visitors or Zones	No of Visitors (1)	Percentage	No of Visitors for Whole Year (1)×12
1	Upper Assam (Composition of Tinsukia, Dibrugarh, Sivasagar, Dhemaji, Lakhimpur and Jorhat districts)	2095	22.29	25140
2	Middle Assam (Composition of Golaghat, Sonitpur, Karbi Anglong, Nagaon, Marigaon districts)	2708	28.8	32496
3	Lower Assam (Composition of Darrang, Kamrup, Nalbari, Barpeta, Bongaigaon, Goalpara, Kokrajhar, Dhubri, Kamrup Metropolitan, Baksa, Udalguri and Chirang districts)	1520	16.17	18240
4	South Assam (Composition of North Cachar Hills, Cachar, Hailakandi and Karganj districts)	19	0.2	228
5	Other North Eastern States Excluding Assam	268	2.85	3216
6	West Bengal	1772	18.85	21264
7	Other States of India Excluding West Bengal and NER states	681	7.24	8172
8	Other Countries of the World Excluding India	337	3.58	4044
Total		9400		112800

Source: Forest Department, KNP, 2011

The third set of data comprises of travel cost, willingness to pay (WTP) for preservation of the park and other individual and household level information obtain from the visitor survey and this can be done simultaneously during the same period.

Sampling is a critical issue in this respect because tourist is a flow concept and there is no certainty for how long the park is opened for tourists because of the flood situations in Assam. While some researchers used stratified sampling from the total population (Choe, at al., 1996; Rosenberger & Loomis, 1999), others prefer random sampling from user group only (Cook and Cable, 1990; Farber, 1988; Sohngen, at al., 1998). In order to estimate the total universe of visitors, the last three years (i.e., from 2007-08 to 2009-10) visitors data are used and found that average 255 number of tourists were visited the park per day. In this study, 230 visitors are interviewed randomly using a structured schedule with a single respondent from each group or family chosen in the sample, which is 3% of the average total tourist flow to the park in a particular month during these last three years.

A pilot survey is carried out in the month of November, 2010 to pre-test the interview schedule of this study. It is done by questioning thirty visitors in KNP with the intention of see how well it serves the rationale of obtaining necessary data for attaining objectives of this study. Accordingly, minor necessary changes were made in the schedule like- minor changes in CV queries to formulate them in a comprehensible form, exclude the extreme bid amounts in dichotomous choice of CV questions, etc.

The interview is conducted at the zip safari stand when the visitors are coming back after visiting the park. Generally one group or family or even a single person do not share the jeep safari with another group or family or person for viewing the park. In order to ensure randomness in the selection of samples, visitors of the first two returning zips in each half an hour are selected during the visiting hours and information is collected from the representative of these groups or families.

4.6 Dealing with Survey Biases

Contingent valuation method is basically based on a hypothetical market situation and so there exists some biases. It is very much essential to reduce these biases to a minimum level, otherwise it gives robust results. The survey instrument of the present study is very much carefully and consciously designed and administered to control these sources of bias.

'*Hypothetical biases*' arise in CV survey because respondents are replying to the CV questions in a hypothetical market situation. In the present study, the date of collection of willingness to pay (WTP) amount is also mentioned in the survey instrument to reduce these biases or to make the situation more real one.

'*Interviewer biases*' may exist if telephone or in-person survey is used to collect the necessary data for a particular study. This bias arises because the respondents try to shape their answers to upgrade their status in the eyes of the interviewer. Smith et al. (1983) conducted a study on Monongahela water quality, in which different respondent characteristics were controlled and found no evidence for interviewer bias. However, it

is possible that this issue could remain considerable in some context. So the respondents of the present study are randomly selected to collect the necessary information.

The choice of the payment or bid vehicle can also affect the WTP results. The '*payment vehicle biases*' arises because the respondents may have preference for a particular bid vehicle. The vehicles most frequently used in CVM studies, such as utility bills, entrance fees, taxes, and higher prices, are likely to be familiar to most respondents. To avoid these biases in the present study simple donation or contribution type of voluntary payment vehicle is set, to keep away from the complicacies of other involuntary payment vehicle like income tax. It is familiar that respondents have positive feelings and preferences towards voluntary payment vehicles.

'*Starting point bias*' arises in the iterative bidding game when the initial bid influences respondent final bids. In theory, the starting bid is merely a tool for initiating the bidding process and should not affect respondent final bids. The starting point bias might arise when the item being valued is poorly defined or not distinctly perceived by the respondent. In the present study, very carefully a pilot survey is carried out and the extreme bid amounts are removed in the final survey to reduce these biases. The respondents also get only one particular randomly assigned bid amount in CV survey of the present study, not a range of bid amounts like Rs. 20 to Rs. 40, to minimize the starting point bias.

'Information bias or embedding bias' arises due to the lack of appropriate or relevant information to the respondents for stating his value judgment correctly. The

hypothetical market scenario in the CV survey is constructed according to the recommendations of the NOAA Panel to reduce these types of biases in this study and as well as certain important information is also provided to the tourists while conducting interviews.

1. Income of the respondent is limited and it has various other essential uses in their daily life.
2. There are many national parks and sanctuaries, apart from KNP, in India.
3. KNP is world famous because of its unique wildlife and biodiversity. It is the homeland of one horned Indian rhinoceros and poaching of this endangered wild animal is a great problem of KNP.
4. These matters which are mentioned here are only a few among many other environmental evils that Assam faces.

All these not only deal with respondents' budget limit and helped in reducing *hypothetical bias* but also it is cooperative to overcome the embedding effects.

4.7 Application of Various Methods on KNP

The recreational or economic value of KNP is estimated in this study by using zonal travel cost method and two types of contingent valuation methods (CVM) – open ended and dichotomous choice of CVMs. And open-ended CVM is applied to determine the influence of the existence of one horned Indian rhinos on economic value of the national park.

4.7.1 Zonal Travel Cost Method

The travel cost model is generally used to estimate the recreational value or use value of environmental resources or services. Zonal Travel Cost Method (ZTCM) can be applied to the site which receives few multiple visits by the same visitor (Tobias and Mendelsohn, 1991; Guha and Ghosh, 2009; Becker, at. al., 2005) in a specific time period. Most of the visitors visit Kaziranga National Park once in a year or two or three times during his whole life time, so in this study ZTCM is used to estimate the economic value of KNP. The demand function or Trip-Generating Function (TGF) which will be estimated in this study can be written as

$$VR_i = f(TC_i, HHI_i, AGE_i)$$

Where

$VR_{i=}$ Visitation rate of *i*-th zone, which can be calculated by

$$VR_i = (N_i/P_i) \times 100000$$

N_i = Estimated number of visitors of the zone *i*

P_i = Total population of the zone *i*

TC_i = Average Total Cost of the trip which includes the total travel cost from the place of origin or *i*-th zone to the Kaziranga National Park (KNP), cost of fooding and lodging, other miscellaneous expenditure, etc.

HHI_i = Average House Hold Income of visitors of zone *i*

AGE_i = Average Age in Years of visitors of zone *i*

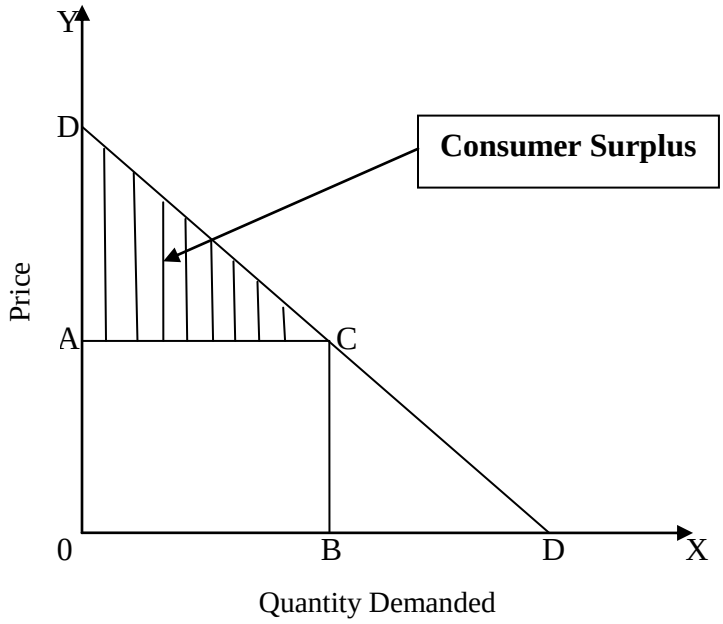
When total travel cost is calculated in ZTCM, opportunity cost of travel time and on-site time spent is excluded because the opportunity cost of travel time can be valued at a fraction (usually between ½ and ¼) of the wage rate (Becker, 1965; Cesario, 1976) but surveys provide data on household income rather than hourly wage rate of the visitor; inferring wage rates by dividing household income by some estimate of hours worked will introduce measurement error (Freeman, 1993). This can be estimated only for the fixed worked hour's labors. And according to McConnell (1992), inclusion of on-site time create problems, as spending more time at a site should enhance value of the visit, while simultaneously increasing the (time) cost. This dual role of on-site time creates a problem for travel cost demand estimation and therefore various researchers advocate to exclude this time cost (Ward and Beal, 2000; Whitten and Bennett, 2002) from the demand model.

In many studies duration of stay of different visitors in the site is taken as independent variable because this variable greatly affects travel costs of the visitors. But in this study it is not consider as an independent variable because 91% of the total sample visitors stay one day in Kaziranga National park.

The consumer surplus (CS) is the difference between the estimated demand prices and the actual expenses that the visitor incurs during the whole trip and it is shown in Figure

4.3. The aggregate consumer surplus has to be estimated with the help of the estimated TGF.

Figure 4.3 Consumer Surplus



Literature on ZTCM shows that suitable functional form for the TGF varies across studies and log-linear and log-log forms are most frequently used (Guha and Ghosh 2009; Chopra, 2004). In this study experiments with different alternative forms of the TGF have been carried out and found that a double-log between visitation rate and travel cost gives the most suitable results. The TGF takes the form as follows for zone 'j'

$$lnVR_j = CONST + \beta_1 lnTC_j + \beta_2 HHI_j + \beta_3 AGE_j \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (1)$$

$$= \beta_1 lnTC_j + Z_j \qquad \text{(Assuming } Z_j = CONST + \beta_2 HHI_j + \beta_3 AGE_j \text{)}$$

Or $VR_j = TC^{\beta_1}.e^{Z_j}$ …… (2)

To estimate the aggregate surplus at first consumer surplus for each zone has to be estimated. For this purpose, a 'choke price' which represents that maximum value of travel cost for which estimated visitation rate falls to zero can be calculated for each zone using the estimated TGF or using equation (2). Then the consumer surplus (per 100,000 populations) is estimated for zone j as follows:

$$= e^{Z_j} \int_{T_j{}^0}^{T_j{}^C} TC^{\beta_1}\, d(TC)$$

$$= e^{Z_j} \frac{1}{\beta_1 + 1} [T_j{}^{C^{\beta_1+1}} - T_j{}^{0^{\beta_1+1}}]$$

The total recreational value of the Kaziranga National Park is measured by summing the total consumer surplus and the total actual expenses of the visitors on this trip that is the whole area under the demand curve for the park.

4.7.2 Contingent Valuation Method

This is one example of direct valuation method. Since mid-1970s, the method is most widely used for estimating economic value of environmental resources and services. The dichotomous choice (DC) or referendum approach is recommended by the NOAA (U.S. National Oceanic and Atmospheric Administration) Panel for a CV type study; because they thought it minimizes possible bias and is also familiar to the respondents

who often vote yes/no on public decision making process. In this study, both the dichotomous-choice of CVM and open ended CVM are used to estimate the economic value of Kaziranga National Park or to estimate willingness to pay for preservation of the park and also to check how much these methods give different results from each other. The hypothetical market scenario of the present study is constructed according to the recommendations of the U.S. National Oceanic and Atmospheric Administration (NOAA). This method is worded in this study as follows:

"Kaziranga National Park is suitable for the growth and survival of unique and diverse wildlife and forest biodiversity. For our economic benefit we are destroying all the natural resources like the forest resources and wildlife without thinking about the future. It creates many environmental problems. For this reason Government has introduced various policies to preserve the quality of the park and introduced the instruments like income tax, property tax, entry fee, etc. to collect the necessary funds to implement these policies, but the Government do not achieved the objectives of these policies till date. Remember that you have limited income and you have to do many personal works with this limited income. Suppose at this time a private agency or NGO comes forward to preserve the park and giving their services very efficiently and after visiting the park, the members of this organization ask you the following questions on willingness to pay (WTP) for protection and preservation of KNP. It is also mentioned that these amounts will be collected in the next month from the respondents.

(a) Do you think contribution for the maintenance of the park is important?

..... Yes/No

(b) Instead of your limited income, would you want to contribute any small amount for park maintenance? ..... Yes/No

(c) If yes, will you voluntarily contribute Rs. X for KNP maintenance above your actual expense? …… Yes/No

(d) What is your maximum willingness to pay for preservation of the park above your actual expenses during the trip? …… Rs……..

(e) Poaching of great Indian one horned rhinoceros in KNP is a great problem. Assume that all the rhinoceros of the park are killed by poachers and you have not seen any rhinoceros during the trip, then how much you want to contribute for conservation of KNP? …… Rs……..

(A) Open Ended CV Method: In the open ended CV method at first a hypothetical market scenario is set up and respondents are simply asked to state their maximum willingness to pay (WTP) for the good that is being valued in this hypothetical market condition (question no (d) is asked for open-ended CV method). To estimate the economic value of the park the following model is estimated by using open-ended CV method:

$$MaxWTP = f(MHI, EDU, AGE, FAMSZ, SEX, EXP)$$

Where, MaxWTP = Maximum Willingness to Pay

MHI = Monthly Household Income

EDU = Education Level

AGE = Age in Years

FAMSZ = Family Size

SEX = Sex or Gender

EXP = Experience of the Trip

(B) Dichotomous Choice of CV Method: In the Dichotomous choice of CV method, visitors receive randomly assigned prices for preservation of the National Park (question no (c) is asked to the respondents for DC type of CV method). Each respondent receives one randomly–drawn price. There are ten (10) different offer prices, which starts from 10 to 100 with an equal interval of 10 and these prices are fixed with the help of the pilot survey of the present study. In the pilot survey, twenty (20) different offer prices or bidding levels have been fixed. But in the final survey only ten different bidding levels have been kept by excluding the extreme offer prices. In this study, the total sample size is 230. So at first all the 230 schedules are equally divided into 10 different sets and each set has a common bid amount. With the help of this method the mean willingness to pay is found by estimating a statistical model for predicting the probability that an individual with specific characteristics will accept an

offer of given size. Individuals know which choice maximizes their utility. It is assumed that individuals will accept or donate a specified donation amount to maximize their utility under the following condition (Hanemann, 1984):

$$v(1, Y - A, E, S) + \varepsilon_1 \geq v(0, Y, E, S) + \varepsilon_0$$

$$\text{or,} \qquad v(1, Y - A, E, S) - v(0, Y, E, S) \geq \varepsilon_{0-} \varepsilon_1$$

where υ is the indirect utility, which is assumed here to equal the utility; Y is the individual's income; A is a donation amount to preserve the KNP; E is the experience of the trip to KNP; S is other socioeconomic characteristic vectors; and, ε_1, ε_0 are the identically, independently distributed random variables with zero means. If the condition does not hold, they will decline to donate.

The utility difference (Δυ) can be expressed as follows:

$$\Delta\upsilon = v(1, Y - A, E, S) - v(0, Y, E, S) + (\varepsilon_1 - \varepsilon_0)$$

Most of the literature on dichotomous choice of CVM [Bowker and Stoll, 1988; Boontho, 2008; Lee at al., 2009; Singha, 2010] assumed that the individual's WTP follows a logistic distribution and therefore in this study it is also assumed that WTP follows a logistic distribution, the probability (π_1) that the individual will accept a donation bid (A) can be expressed as:

$$\pi_1 = \Pr(i = 1)$$

$$= \Pr[\ v(1, Y - A, E, S) - v(0, Y, E, S) \geq \varepsilon_{0-} \varepsilon_1]$$

$$= \Pr(\Delta\upsilon \geq 0)$$

$$= F[A, Y, E, S: \beta, \gamma, \delta, \lambda]$$

where Pr(-) is the probability function, F[-] is the cumulative density function, and β, γ, δ and λ are the parameters to be estimated for donation bids, income, experience of the trip and demographic variables, respectively. This relationship holds good because if $\Delta\upsilon$ is assumed to have a logistic cumulative density function is equal to

$$\mathrm{P_i} = \Pr(i = 1) = \frac{1}{(1 + e^{-\Delta\upsilon})}$$

Where $\mathrm{P_i}$ is the probability of accepting the offered bid amount then the probability of not accepting the bid amount can be expressed as $(1 - \mathrm{P_i})$. So,

$$1 - \mathrm{P_i} = \Pr(i = 0) = \frac{1}{(1 + e^{\Delta\upsilon})}$$

Therefore, $$\frac{\mathrm{P_i}}{1-\mathrm{P_i}} = \frac{(1+e^{\Delta\upsilon})}{(1+e^{-\Delta\upsilon})} = e^{\Delta\upsilon}$$

By taking natural log in both side of the equation

$$L_i = \ln(\frac{\mathrm{P_i}}{1 - \mathrm{P_i}}) = \Delta\upsilon$$

The natural-log of the odds ratio in favor of accepting the bid amount or the ratio of the probability that a visitor will accept a bid amount to the probability that it will not accept that particular bid amount (it is also called ‘logit’) is not only a linear function of

the explanatory variables but also linear of the parameters, because Δυ is a linear function of income level, bid amount, experience of the trip and socio-economic characteristics of the visitors.

The estimated model is logit regression, which helps to sketch the relationship between the offer price and the probability of acceptance by individuals with specific characteristics. Yes (1) and no (0) will be used as the dependent variable with the bid and other socio-economic determinants of the acceptance or rejection of the bid as the independent variables. In this study, the regression model which is used to estimate the economic value (i.e., use value) of the park is written as

$$Logit(Y) = f(BID, MHI, EDU, AGE, FAMSZ, SEX, EXP)$$

Where, Logit(Y) = Probability of accepting the offered bid amount

MHI = Monthly Household Income

EDU = Educational Level

AGE = Age in Years

FAMSZ = Family Size of the Respondent

SEX = Sex or Gender

EXP = Experience of the Trip

The mean WTP will be calculated by dividing the intercept by the coefficient of the bid level. Mathematical derivation of this method is given by Haneman in 1991. The mathematical derivation of the formula to calculate mean WTP from the econometric model is shown below:

Assume that an individual's utility depends on a compositing commodity, X and left over income that is kept for purchasing environmental goods. Utility has a deterministic component and a random component, ε. Utility of the individual before answering the CVM question is:

$$U_0 = X_0\beta + \gamma Y + \varepsilon_0 \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (1)$$

If the individual accepts the bid given to him, his utility is:

$$U_1 = X_1\beta + \gamma(Y - WTP) + \varepsilon_1 \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots.. (2)$$

From (1) and (2):

$$U_0 - U_1 = X_0\beta - X_1\beta + \gamma WTP + \varepsilon_0 - \varepsilon_1 \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots.. (3)$$

Or $$U_0 - U_1 = \alpha + \gamma WTP + \varepsilon_0 - \varepsilon_1 \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (4)$$

Taking the expectation from both sides:

$$E(U_0 - U_1) = E(\alpha) + E(\gamma).E(WTP) + E(\varepsilon_0 - \varepsilon_1) \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots (5)$$

The individual accepts the bid if and only if $U_0 \leq U_1$. Assuming that the individual is indifferent between U_0 and U_1 ,

$$E\left[U\left(X_{1,}Y - WTP\right) + \varepsilon_1\right] = E[U(X_0 Y) + \varepsilon_0] \quad \ldots\ldots\ldots\ldots\ldots (6)$$

Then, $0 = \alpha + \gamma E(WTP)$

Or $MWTP = -\alpha/\gamma$ ……. (7)

4.7.3 Tests of Validity and Reliability

Validity test is carried out to test the reliability of a CV study, since CVM is based on a hypothetical market situation. There are four means to ascertain the reliability of CVM results and they are (a) test-retest procedures, (b) convergent validity, (c) construct validity and (d) temporal stability test.

In the present study, convergent validity test is carried out to estimate the reliability of CV method. In the last three decades, this test is most widely used by the researchers. Convergent validity checks compare CVM estimates for the Kaziranga National Park with estimates gained from zonal travel cost model. This comparison is carried out in two ways. First, the actual estimates of CV and ZTCM are compared as ratios. Second, correlation coefficient is estimated between estimates based on the two different techniques.

4.7.4 Value of KNP without Rhinos

Poaching of Indian one horned rhinoceros is a great problem in KNP and most of tourists from far off places visit the park mainly for viewing this unique wild animal. So

its existence has a great influence on economic value of the park. In the present study, influence of the existence of one horned Indian rhinoceros on economic value of KNP is also estimated with the help of open-ended contingent valuation method. In this analysis, two different environmental situations or conditions of the park are put forward in front of the visitors: one situation is the present situation, i.e., rhinoceros are present in KNP and the another situation in which all the rhinoceros are killed by poachers, means this wild animal is missing in the park (question no (e) is asked for this purpose). In these two different alternative situations, tourist's willingness to pay for preservation of KNP is estimated.

4.7.5 Methods regarding Willingness to Visit KNP Again

This analysis is carried out to show how the decision of tourists regarding willingness to visit again the park is affected by their various socio-economic characteristics. Generally tourists do not visit the same place repeatedly because of various reasons, such as limited income, existence of other eco-tourist destinations or spots, distance between home and tourist spot, etc. It is not exceptional for Kaziranga National Park also. Only a part of all the tourists, who have visited the park in 2010-2011, may want to visit it once again. So in this analysis, there are two groups of tourists: one group wants to visit the park once again and the other group does not. Visitors express their decisions regarding willingness to visit again the park in 'Yes' or 'No' responses. So the dependent variable in this analysis is a qualitative one and to analyze this type of models generally Logit or Probit regression models are used. Out of these two models, distribution of the error term determines which model gives better results. If error term

of the regression model follows logistic distribution then Logit model is used and when error term follows normal distribution then Probit model is carried out. In the present study, it is assumed that the error term follows normal distribution and Probit model is used to determine how various socio demographic characteristics affect the decision regarding willingness to visit again the park.

Chapter 5

5.1 Introduction

This chapter discusses results of the present study. It is categorized into two different parts: descriptive statistical analysis, and econometric analysis.

5.2 Descriptive Statistical Analysis: This section includes results regarding background characteristics of the visitors, their WTP for preservation of KNP and willingness to visit again the park. The results of this section are as follows:

(A) In the present study, 230 sample visitors/tourists are randomly selected and interviewed using a well structured pretested schedule. Demographic features of the tourists are shown in Table 5.1 and the descriptive findings of this table are discussed below. The terms tourists, visitors and respondents have been interchangeably used to mean the same set of people – namely the selected sample of visitors to the park.

1. Highest numbers of tourists come from Upper Assam, Lower Assam, Middle Assam and West Bengal. But from South Assam lowest numbers of tourists come to visit the Kaziranga National Park (KNP). This is primarily because of the communications problem. Most of the tourists have used rail or/and road transport in

Table 5.1 Demographic Profile of the Tourists

Variable		Frequencies	Percentage
Respondents		230	
Origin:	**Middle Assam**	41	17.83
	Upper Assam	60	26.09
	Lower Assam	46	20
	South Assam	3	1.3
	North Eastern States excluding Assam	11	4.78
	West Bengal	42	18.26
	Other States of India excluding NER	17	7.39
	Foreigners	10	4.35
Age:	**21-30**	28	12.17
	31-40	64	27.83
	41-50	86	37.39
	51-60	44	19.13
	61-70	6	2.6
	71-80	2	0.87
Sex:	**Male**	152	66
	Female	78	34
Religion:	**Hindu**	197	85.65
	Muslim	16	6.96
	Christian	12	5.22
	Buddhist	5	2.17
Educational Level	**P.G. & Above**	74	32.17
	Graduate/Polytechnic	91	39.57
	10+2 Pass	37	16.09
	10 Pass	25	10.87
	Below Secondary	3	1.3
	Primary & Illiterate	0	0
Occupation:	**Salaried Employee**	144	62.6
	Self Employed	51	22.17
	Agriculture/Fishery	7	3.04
	Professional (Doctor, lawyer, etc.)	15	6.52
	Others (House wife, Student, Retired, etc)	13	5.65
Monthly Household Income	**0-10000**	0	0
	10000-20000	7	3.04
	20000-50000	116	50.43
	50000-100000	88	38.26
	100000-200000	15	6.52
	200000-500000	4	1.74
	500000>	0	0
Purpose of Visit	**Official**	1	0.4
	Educational Tour	6	2.6
	Viewing Wildlife & Biodiversity	202	87.8
	Research/Project	5	2.2
	Picnic	16	7

Source: Author's Calculation based on selected sample of tourists in KNP Jan-Feb, 2011

this particular trip to KNP, but road and rail communication facilities are too poor in the southern part of Assam as compared to the other parts. For the same reason tourists flow to the park from other parts of the North Eastern States excluding Assam, is also low. Excluding these places in the region, it can be concluded that as distances between the park and places of origin increases, tourist inflow pressure decreases.

2. Visitors above the age of twenty years have been considered as sample in the study. Here it is simply assumed that because of their knowledge, awareness, consciousness and mental maturity, they should understand the hypothetical market situation better in a contingent valuation method - especially in deciding how much they are willingly pay for preservation of the park, travel cost of the trip, etc. It is found that most of the tourists who have visited the park belong to 41-50 years age group. The lowest numbers of tourists are found in the 71-80 years age group. All tourists are divided into three different age groups the groups are as follows: (a) 21-30 years age group (in this group mainly students, unemployed persons are included, dependent on earning members of a family), (b) 31-60 years age group or working class group (here mainly the earning members of a family or the decision making persons of a household are included), and (c) above 61 years age group (in which mainly retired persons and aged persons of a family are included and they are mainly dependent on the earning members of the family), then it can be concluded that most of the tourists belong to 31-60 age group or those earning persons who have the decision making power in a family.

3. A sample of 230 visitors was selected randomly for interview. Out of them 66 percent are male and 34 percent are female. Almost 85 percent of the total tourists

belong to the Hindu community. This is because around 95 percent of the sample tourists are Indians. Near about 2 percent, (which is the lowest among all the religious groups) of the visitors are Buddhists.

4. In categorizing all visitors according to their educational level, it is found that all tourists are educated and most of them are graduates or polytechnic course qualified and post graduate (40 percent sample respondents are graduate/ polytechnic and 32 percent belong to the post graduate and above category).

5. It is also found that about 63 percent of total tourists are employed in public and private sectors. Only around 3 percent, of visitors are engaged in agricultural and its allied activities.

6. People visit the park for various purposes and if these purposes are categorized as official, educational tour, viewing wildlife and its biodiversity and picnic. It is found that 88 percent of visitors visit the national park for enjoying and viewing unique wildlife and natural beauty of the park.

(B) In Table 5.2, occupation wise monthly household incomes of the tourists are shown. The findings of this table are discussed below:

1. Most of the tourists (i.e., public and private sector employee, self employed, engaged in agriculture and its allied sectors, professionals, retired persons, housewife, etc.) belong to the monthly household income groups of Rs.20,000 to Rs.50,000 and Rs.50,000 to Rs.1,00,000 income. The reason being that 95percent of total sample tourists are Indians and more specifically from the Indian middle class.

Table 5.2 Occupation wise Monthly Household Income

		Monthly Household Income Group (in INR)						
		0-10000	**10000-20000**	**20000-50000**	**50000-100000**	**100000-200000**	**200000-500000**	**Above 500000**
Occupation	**Salaried Employee**	0	3 (2.1%)	68 (47.2%)	59 (41%)	11 (7.6%)	3 (2.1%)	0
	Self Employed	0	1 (2%)	29 (56.9%)	17 (33.3)	3 (5.9%)	1 (2%)	0
	Agriculture/ Fishery	0	1 (14.3%)	3 (42.9%)	3 (42.9%)	0	0	0
	Professional	0	1 (6.7%)	9 (60%)	4 (26.7%)	1 (6.7%)	0	0
	Others	0	1 (7.7%)	7 (53.8%)	5 (38.5%)	0	0	0

Source: Author's Calculation based on selected sample of tourists in KNP Jan-Feb, 2011.

2. It is also found that 3 percent of total visitors are engaged in agriculture and its allied activities and most of them have monthly household income of Rs. 20,000 to Rs. 1,00000. This shows that those visitors who have engaged in agricultural activities are not poor/marginal farmers.

(C) Tourists come from various parts of the world to visit the National Park, but purpose of visit is not similar for all the visitors. In this study purpose of visiting the park is divided into five categories and they are as follows: official, educational,

enjoying wildlife and its biodiversity, research/project and picnic. In Table 5.3, origin of the tourists is put against purpose of visiting the park and findings of this table are as follows:

1. Most of the tourists from all over the world visit the National Park for viewing unique wildlife and natural beauty of it.

Table 5.3 Origin wise Purpose of Visit

		Purpose of Visit				
		Official	**Educational Tour**	**Wildlife & Natural Beauty**	**Research/ Project**	**Picnic**
Origin of the Tourists	**Upper Assam**	0	1(1.7%)	56(93.3%)	0	3(5%)
	Lower Assam	1(2.2%)	2(4.3%)	36(78.3%)	0	7(15.2%)
	Middle Assam	0	2(4.9%)	32(78%)	1(2.4%)	6(14.7%)
	South Assam	0	0	3(100%)	0	0
	NER States	0	0	11(100%)	0	0
	West Bengal	0	1(2.4%)	40(95.2%)	1(2.4%)	0
	Other States of India	0	0	15(88.2%)	2(11.8%)	0
	Foreigners	0	0	9(90%)	1(10%)	0

Source: Author's Calculation based on selected sample of tourists in KNP Jan-Feb, 2011.

2. Some tourists from nearby places (i.e., upper Assam, lower Assam and middle Assam) also visit the park for picnic purposes. There is a beautiful picnic spot in Karbi Anglong district, which is so much close from the Kohora range of the park. Many people from various parts of the Brahmaputra valley come to KNP for picnic on the occasion of Christmas and New Year, i.e. during the Christmas weekend. They also enter the park for viewing its wildlife and biodiversity.

(D) The tourists are engaged in various types of professions. In Table 5.4, origin of the tourists are shown against their occupation and the findings are as follows:

Table 5.4 Origin wise Occupation of the visitor

		Occupation				
		Salaried Employee	**Self Employed**	**Agriculture/ Fishery**	**Professional**	**Others**
Origin of the Tourists	**Upper Assam**	41(68.3%)	11(18.3%)	3(5%)	4(6.7%)	1(1.7%)
	Lower Assam	29(63%)	10(21.7%)	1(2.2%)	5(10.9%)	1(2.2%)
	Middle Assam	25(61%)	12(29.3%)	3(7.3%)	1(2.4%)	0
	South Assam	1(33.3%)	2(66.7%)	0	0	0
	NER States	4(36.4%)	5(45.4%)	0	1(9.1%)	1(9.1%)
	West Bengal	34(81%)	4(9.4%)	0	2(4.8%)	2(4.8%)
	Other States of India	8(47.1%)	6(35.3%)	0	2(11.8%)	1(5.8%)
	Foreigners	2(20%)	1(10%)	0	0	7(70%)

Source: Author's Calculation based on selected sample of tourists in KNP Jan-Feb, 2011.

1. Most of the visitors from upper Assam, lower Assam, middle Assam and West Bengal are employed (salaried service holders) in public and private sectors.

2. It is also found that most of the tourists originating from foreign countries belong to the 'others' category. The housewife, retired persons, students, etc. are included in the 'others' category.

Table 5.5 Origin wise Age of the Visitors

		Age Group					
		21-30	**31-40**	**41-50**	**51-60**	**61-70**	**71-80**
Origin of the Tourists	**Upper Assam**	7(11.7%)	17(28.3%)	22(36.7%)	14(23.3%)	0	0
	Lower Assam	10(21.7%)	14(30.4%)	14(30.4%)	8(17.5%)	0	0
	Middle Assam	6(14.6%)	20(48.8%)	10(24.4%)	5(12.2%)	0	0
	South Assam	0	0	2(66.7%)	1(33.3%)	0	0
	NER States	0	3(27.3%)	6(54.5%)	2(18.2%)	0	0
	West Bengal	3(7.1%)	5(11.9%)	23(54.8%)	10(23.8%)	1(2.4%)	0
	Other States of India	1(5.9%)	2(11.8%)	9(52.9%)	4(23.5%)	1(5.9%)	0
	Foreigners	1(10%)	3(30%)	0	0	4(40%)	2(20%)

Source: Author's Calculation based on selected sample of tourists in KNP Jan-Feb, 2011.

(E) In Table 5.5, all the sample tourists from different origins or places are classified according to their age groups. Findings of this table are as follows:

1. Most of the Indian visitors belong mainly to two age groups, i.e., 31-40 and 41-50. This may be due to the fact that newly married couples, small and nuclear families have a tendency of making annual trips to different beautiful places in the country. Generally these places are hill stations, national parks, places of historic interest, and so on.

2. Around 60% of the foreign tourists belong to 61-70 and 71-80 age groups. From this it can be concluded that most of the foreign visitors after taking retirement from their occupation or services, make trips to different naturally beautiful places of the world. This is because they want to spend some of their old age days in a natural environment and for this purpose they visit different eco-tourism destinations of the world.

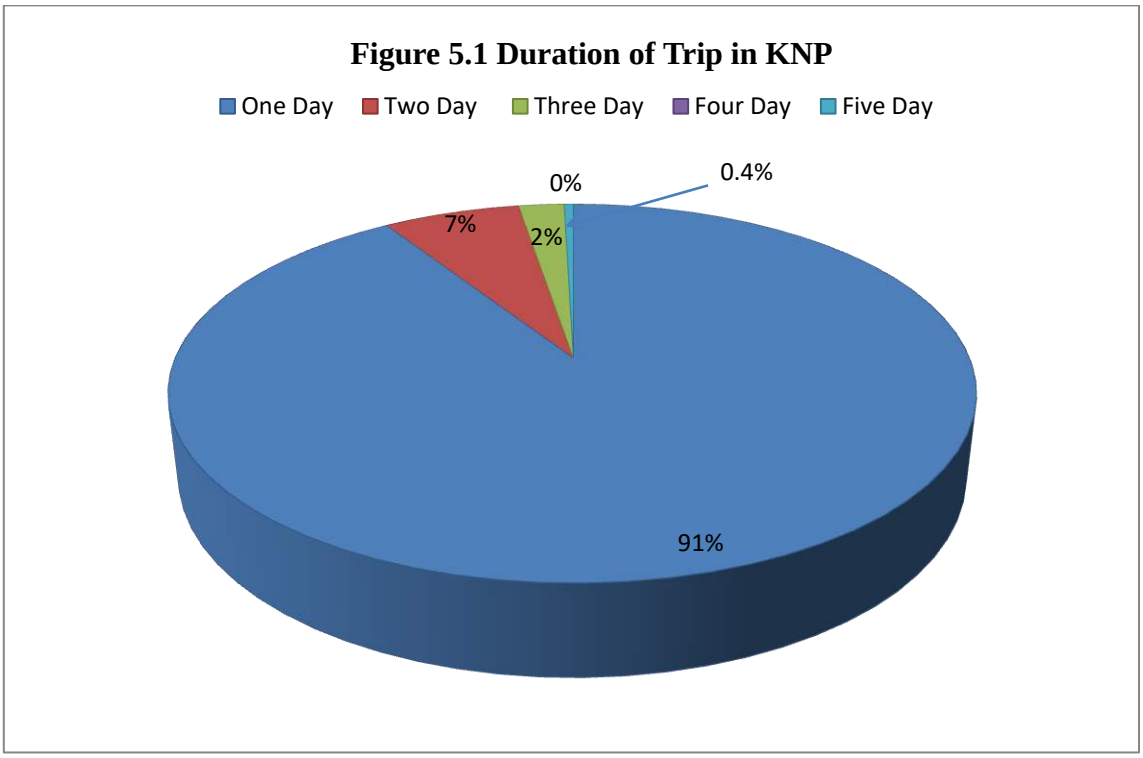
(F) In Table 5.6, the number of persons coming together in a trip to KNP is shown against their place of origins. It is found that most of the tourists from different places want to visit KNP in small groups. These small groups may be couples, small families, etc. The medium size and large size group of visitors mainly come from nearby places, i.e., these groups of visitors are mainly coming from different parts of the Brahmaputra Valley of Assam. It is observed that the tourists from far off places visit KNP only in a small group. From this table it can be concluded that as distance between KNP and the origin of the tourist increases, the number of persons coming in the trip to KNP decreases. This is a sample observation and may not be generalized.

Table 5.6 Number of Visitors According to their Place of Origin

		Number of Persons coming in the trip			
		Very Small Group (1-5)	**Small Group (6-10)**	**Medium Group (11-15)**	**Large Group (Above 15)**
Origin of the Tourists	**Upper Assam**	51(85%)	3(5%)	4(6.7%)	2(3.3%)
	Lower Assam	33(71.7%)	9(19.7%)	2(4.3%)	2(4.3%)
	Middle Assam	21(51.2%)	12(29.3%)	7(17.1%)	1(2.4%)
	South Assam	2(66.7%)	1(33.3%)	0	0
	NER States	6(54.5%)	4(36.4%)	1(9.1%)	0
	West Bengal	28(66.7%)	13(31%)	1(2.3%)	0
	Other States of India	15(88.2%)	2(11.8%)	0	0
	Foreigners	8(80%)	2(20%)	0	0

Source: Author's Calculation based on selected sample of tourists in KNP Jan-Feb, 2011.

(G) Tourists come from different places to KNP and participate in recreational activities of the park for getting aesthetic pleasure. It is found that (Figure 5.1) 91percent of the total tourists spend only one day in KNP. There is only one way or option to get aesthetic pleasure in the National Park and the way is viewing its wildlife and biodiversity by elephant ride or jeep safari. So most of the tourists do not want to spend more than one day in KNP.



Source: Author's Calculation based on selected sample of tourists in KNP Jan-Feb, 2011.

(H) Tourists make trips to KNP for various purposes. In Table 5.7, purpose of taking trips to the park by the visitors is considered according to the number of days spent in KNP and the findings of this table are as follows:

1. Around 88 percent of the total visitors (from Table 5.1), visit the park for viewing its wildlife and biodiversity and it is found from Table 5.7 that most of them who have made trip to KNP for viewing its wildlife and biodiversity spend only one day in the park.

2. Those tourists who want to spend three to five days in the National Park are engaged in research or project work related to it and it is a small fraction of the total sample tourists.

Table 5.7 Number of Days Spent according to Purpose of Visit

		Purpose of Visit				
		Official	**Educational Tour**	**Wildlife & Natural Beauty**	**Research/ Project**	**Picnic**
Duration of Trip	**One Day**	1	6	186	0	16
	Two Day	0	0	15	0	0
	Three Day	0	0	1	4	0
	Four Day	0	0	0	0	0
	Five Day	0	0	0	1	0

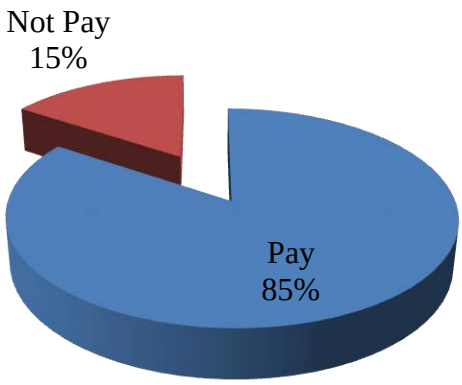
Source: Author's Calculation based on selected sample of tourists in KNP Jan-Feb, 2011.

(I) Visitors' willingness to pay for preservation of Kaziranga National Park is also estimated in this study. From Figure 5.2, it is found that 84.8 percent of the total sample visitors willingly want to contribute some amount of money for conservation or preservation of KNP. But 15.2 percent of the total tourists do not want to pay any amount, because-

Firstly, they think that it is Government responsibility. The Government collects revenues from them through various fiscal measures every year and should allocate larger budgetary resources for preservation purposes.

Secondly, they have already paid entry fee, guard fee and road tax for visiting the National Park. If these amounts are properly used for preservation purposes then it should arguably be a sufficient amount.

Fig 5.2 Willingness to Pay of the Tourists



Source: Author's Calculation based on selected sample of tourists in KNP Jan-Feb, 2011.

Thirdly, visitors also thought that corruption is so much high in Assam and therefore their little contributions are also misused and does not help in preservation purposes of KNP.

(J) This willingness to pay is shown from various aspects of the visitors in Table 5.8 and the conclusions drawn from this table are discussed below:

Table 5.8 Willingness to Pay of the Tourists from Various Aspects

Variable		Willingness To Pay		Willingness To Pay	
		Pay	Not Pay	Pay (%)	Not Pay (%)
Origin:	Middle Assam	37	4	90.2	9.8
	Upper Assam	51	9	85	15
	Lower Assam	38	8	82.6	17.4
	South Assam	3	0	100	0
	North Eastern States excluding Assam	10	1	90.9	9.1
	West Bengal	32	10	76.2	23.8
	Other States of India excluding NER	16	1	94.1	5.9
	Foreigners	8	2	80	20
Age:	21-30	26	2	92.9	7.1
	31-40	54	10	84.4	15.6
	41-50	74	12	86	14
	51-60	36	8	81.8	18.2
	61-70	4	2	66.7	33.3
	71-80	1	1	50	50
Sex:	Male	132	20	86.8	13.2
	Female	63	15	80.8	19.2
Educational Level	P.G. & Above	64	10	86.5	13.5
	Graduate/Polytechnic	78	13	85.7	14.3
	10+2 Pass	31	6	83.8	16.2
	10 Pass	20	5	80	20
	Below Secondary	2	1	66.7	33.3
	Primary & Illiterate	0	0	0	0
Occupation	Salaried Employee	125	19	86.8	13.2
	Self Employed	42	9	82.4	17.6
	Agriculture/Fishery	6	1	85.7	14.3
	Professional (Doctor, lawyer, etc.)	13	2	86.7	13.3
	Others (House wife, Student, Retired, etc)	9	4	69.2	30.8
Monthly Household Income	0-10000	0	0	0	0
	10000-20000	3	4	42.9	57.1
	20000-50000	94	22	81	19
	50000-100000	81	7	92	8
	100000-200000	13	2	86.7	13.3
	200000-500000	4	0	100	0
	500000>	0	0	0	0

Source: Author's Calculation based on selected sample of tourists in KNP Jan-Feb, 2011.

1. If all the visitors are divided into eight different zones according to their places of origin, then it is found that above 75 percent of tourists from each zone willingly want to pay (contribution) some amount for conservation of KNP.

2. If all the tourists are categorized according to their corresponding age groups, then it is found that the percent of respondents willing to pay (WTP) in the first four age groups of visitors (i.e., 21-30, 31-40, 41-50 and 51-60) is higher than that of the last two groups (i.e., 61-70 and 71-80). More than 80 percent of the visitors (respondents) in the first four age groups of tourists are willing to pay towards conservation of the park but for the last two groups figures are roughly between 50 percent and 66 percent. So it may be concluded that more tourists belonging to lower age groups want to contribute more as compared to that of the higher age groups for preservation of KNP. The tourists belonging to higher age have more experience regarding corruption and may be inclined to think that their little contribution would also be misused in this corrupt economy. So they want to contribute little. But from the present study it is evident that younger tourists want to contribute more for protection of the KNP. One reason could be that the younger groups of tourists are more aware regarding ecological and environmental degradation, imbalance and pollution. The Government may have to depend more on the younger generation for the implementation of environment protection laws.

3. It is also found that more than 80 percent of the tourists irrespective of gender (i.e., both male and female) willingly want to pay some amount for conservation purposes of the park. Higher numbers of male respondents are found to willingly contribute some amount compared to the female respondent. A plausible explanation

could be that women realize more accurately about the budget constraint of a family and may be more concerned about saving of money and spending little. Women are not poor in this study as because they belong to those families who have more than 10,000 (in INR) monthly household income (from Table 5.1) and so they do not correctly anticipate about the situation. The realization about the environmental degradation of the interviewed women are lower than that of poor (BPL) rural women in general because most of the poor women in rural areas in India are dependent on the environment for their basic necessities like food, fuel, water, etc.

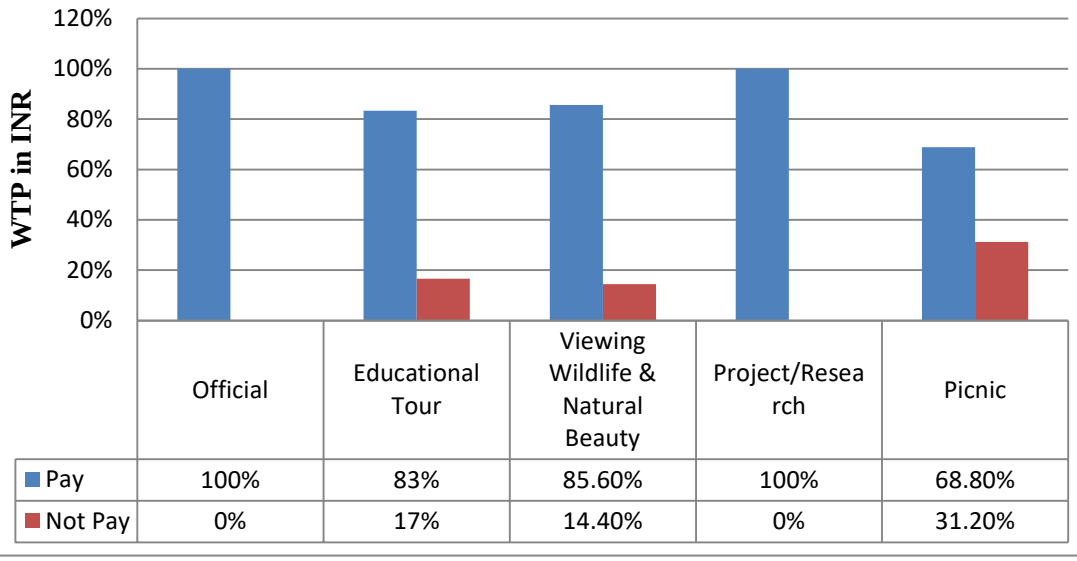
4. If WTP is seen according to occupation of the visitors then it is found that more than 80 percent of tourists who are employed in public or private sector or self employed or engaged in agriculture and its allied activities or professionals, want to contribute some amount for preservation of the park. But only 69 percent of the 'other' category want to pay for conservation of KNP, because in this category the students, housewives, retired persons are included.

5. It is found that more than 80 percent of the visitors whose have more than INR 20,000 monthly household income want to contribute some amount for the preservation of the park, but it is lower for those visitors having less than INR 20,000 household income. So it is concluded that the chances of WTP for preservation purposes of KNP increases as income of visitor's household increases.

(K) If chances of willingness to pay (WTP) for preservation of KNP is counted according to purposes of visiting the national park by visitors (Figure 5.3) then it is

found that higher number of visitors (more than 80%) from first four categories of purposes (i.e., official, educational tour, viewing wildlife and biodiversity and research or project) willingly contribute some amount for conservation of the park. This is not true for those visitors who come to the park for picnic purposes (68.8%). Around 69 percent of them are willing to pay anything at all.

Fig 5.3 WTP According to Purpose of Visit



	Official	Educational Tour	Viewing Wildlife & Natural Beauty	Project/Research	Picnic
Pay	100%	83%	85.60%	100%	68.80%
Not Pay	0%	17%	14.40%	0%	31.20%

Source: Author's Calculation based on selected sample of tourists in KNP Jan-Feb, 2011.

(L) In Table 5.9, percentages of willingness to pay for preservation of KNP are seen against experience of the trip. It is found that higher number of visitors among those who are satisfied in the particular trip want to pay some amount for conservation purposes. Correspondingly, a lower percentage of visitors among those who are not

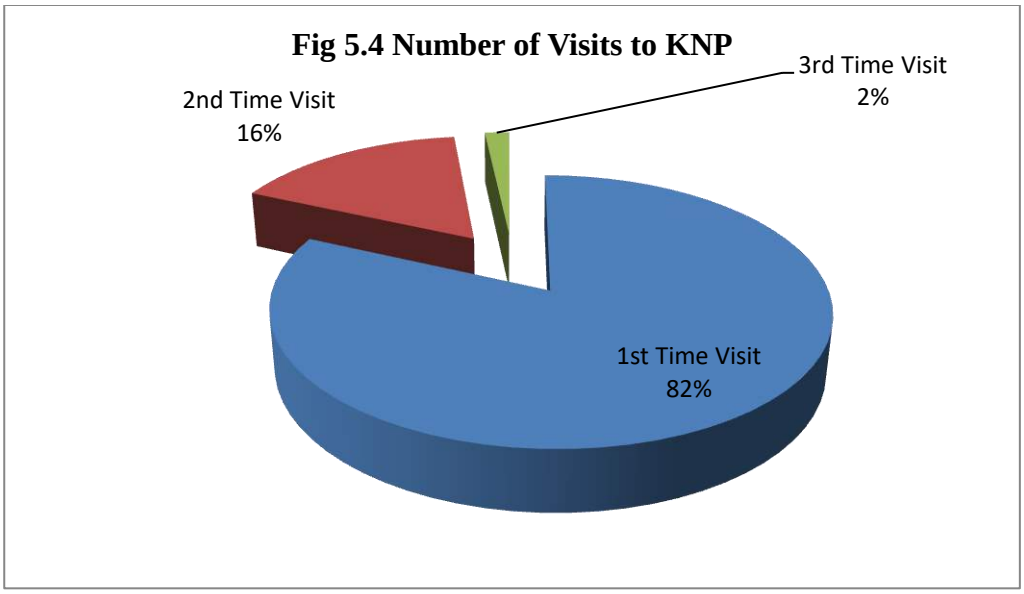
satisfied from the trip are willing to pay some contribution. It is also found that about 24 percent of the displeased tourists do not want to contribute any amount for preservation and protection of the park. The policy lesson is that the Government should provide better facilities to the tourists in the park so as to make the trip enjoyable and pleasant.

Table 5.9 WTP According to Experience of the Trip

Variables		Willingness to Pay		Willingness to Pay	
		Pay	Not Pay	Pay (%)	Not Pay (%)
Experience of the Trip	Satisfied	117	10	92.1	7.9
	Not Satisfied	78	25	75.7	24.3

Source: Author's Calculation based on selected sample of tourists in KNP Jan-Feb, 2011.

(M) In Figure 5.4, the visitors' frequency of travelling to Kaziranga National Park is shown. From this Figure it is found that 82% of the total tourists are first time visitors to the park and only 16 percent and 2 percent of the visitors make a trip to KNP for second and third time respectively. If frequency of travelling to KNP is shown according to the places of origin of the visitors (Table 5.10), then it is found that from every part of the world visitors come to KNP, but the Indian visitors mainly from the Brahmaputra valley are found to visit the park for second and third time respectively. The majority of visitors outside Brahmaputra valley are first time visitors. So it can be concluded that frequency of travelling decreases as distances between the park and the places of origin of visitors increase.



Source: Author's Calculation based on selected sample of tourists in KNP Jan-Feb, 2011.

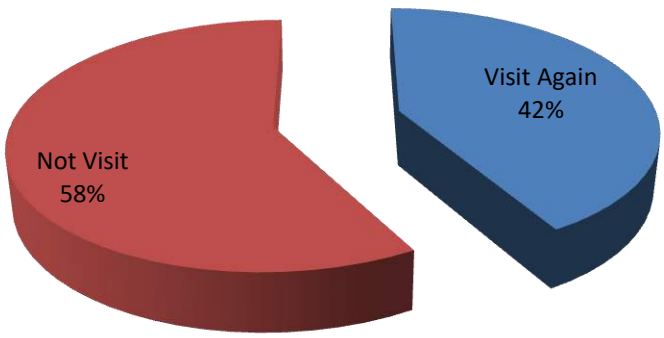
Table 5.10 Frequency of Travelling According to Origins

		Origin of the Tourists							
		Upper Assam	**Lower Assam**	**Middle Assam**	**South Assam**	**NER States**	**West Bengal**	**Other States of India**	**Foreigners**
No of Visit	**First Time**	49	35	32	3	8	36	15	10
	Second Time	9	10	8	0	3	6	2	0
	Third Time	2	1	1	0	0	0	0	0

Source: Author's Calculation based on selected sample of tourists in KNP Jan-Feb, 2011.

(N) In Figure 5.5, visitors' willingness to visit KNP again is shown. From this Figure it is found that around 58 percent of the total sample tourists do not want to visit the park again and 42 percent want to visit again. There are many eco-tourist destinations in India, so the tourists want to visit other tourist spots in their busy life schedule instead of visiting the same place once again. For this reason relatively small numbers of visitors want to visit KNP once again.

Fig 5.5 Willingness to Visit KNP Again



Source: Author's Calculation based on selected sample of tourists in KNP Jan-Feb, 2011.

(O) Willingness to visit the park once again is shown from various aspects of the visitors in Table 5.11 and the findings of this table are as follows:

1. If chances of willingness to visits once again the national park is shown according to places of origin of the tourists, then it is found that the highest number of visitors

Table 5.11 Willingness to Visit from Various Aspects of the Visitors

Variable		Willingness To Visit		Willingness To Visit	
		Visit	Not Visit	Visit (%)	Not Visit (%)
Origin	Middle Assam	26	15	63.4	36.6
	Upper Assam	30	30	50	50
	Lower Assam	20	26	43.5	56.5
	South Assam	0	3	0	100
	North Eastern States excluding Assam	4	7	36.4	63.6
	West Bengal	11	31	26.2	73.8
	Other States of India excluding NER	5	12	29.4	70.6
	Foreigners	0	10	0	100
Age	21-30	17	11	60.7	39.3
	31-40	38	26	59.4	40.6
	41-50	35	51	40.7	59.3
	51-60	6	38	13.6	86.4
	61-70	0	6	0	100
	71-80	0	2	0	100
Sex:	Male	66	86	43.4	56.6
	Female	30	48	38.5	61.5
Educational Level	P.G. & Above	37	37	50	50
	Graduate/Polytechnic	44	47	48.4	51.7
	10+2 Pass	7	30	18.9	81.1
	10 Pass	7	18	28	72
	Below Secondary	1	2	33.3	66.7
	Primary & Illiterate	0	0	0	0
Occupation	Salaried Employee	57	87	39.6	60.4
	Self Employed	24	27	47.1	52.9
	Agriculture/Fishery	3	4	42.9	57.1
	Professional (Doctor, lawyer, etc.)	6	9	40	60
	Others (House wife, Student, Retired, etc)	6	7	46.2	53.8
Monthly Household Income	0-10000	0	0	0	0
	10000-20000	1	6	14.3	85.7
	20000-50000	47	69	40.5	59.5
	50000-100000	43	45	48.9	51.1
	100000-200000	5	10	33.3	66.7
	200000-500000	0	4	0	100
	500000>	0	0	0	0

Source: Author's Calculation based on selected sample of tourists in KNP Jan-Feb, 2011.

who want to visit once again the park are from middle Assam and the lowest is from south Assam and foreign countries. So it can be concluded that as the distances between the park and the origin of visitor increases, chances of willingness to visit KNP once again decreases excluding the case of south Assam. The tourists from south Assam do not want to visit the park once again because communication facility of this region is too poor.

2. If visitors' willingness to visit again is seen against different age groups of the tourists then it is found that most of the tourists who want to visit the park again belong to 21-30 (60.7%) and 31-40 (59.4%) age groups and the lowest are from above 60 years age groups. A very small number of old age tourists want to visit the park again and for this reason also possibility of their WTP is low. So, as age of visitors increases the chances of visiting the park once again decreases.

3. Gender of visitors does not affect the decision about willingness to visit KNP once again, because almost 40% of both male and female tourists want to visit the park once again.

4. Chances of visiting the park once again is higher for those tourists who have completed their graduate and post graduate courses (48% to 50%) compared to the tourists of the under graduate standard (19% to 33%).

5. The decision about the chances of visiting the park once again is not affected by their occupations in which they are engaged, because 40% to 47% of tourists from all categories of occupation want to visit KNP once again.

Table 5.12 Monthly Household Incomes of Visitors According to Origins

		Monthly Household Income Group						
		0-10000	**10000-20000**	**20000-50000**	**50000-100000**	**100000-200000**	**200000-500000**	**Above 500000**
Origin of the Tourists	**Upper Assam**	0	2	33	25	0	0	0
	Lower Assam	0	2	35	8	1	0	0
	Middle Assam	0	3	24	13	1	0	0
	South Assam	0	0	2	1	0	0	0
	NER States	0	0	6	5	0	0	0
	West Bengal	0	0	10	24	8	0	0
	Other States of India	0	0	5	10	2	0	0
	Foreigners	0	0	1	2	3	4	0

Source: Author's Calculation based on selected sample of tourists in KNP Jan-Feb, 2011.

6. The monthly household income groups who have incomes higher than INR 20,000 and below INR 200,000, have a higher chance of visiting KNP once again compared to those who have monthly household income of less than INR 20,000. But tourists having monthly household income of more than INR 200,000 do not want to visit the park once

again. The simple reason is evident from Table 5.12. Actually it is found that the tourists who have monthly household income of more than INR 200,000 are foreigners and the decision about a trip is not only determined by income but also the age of the visitors and distances between the tourist spot and home town of the tourists.

5.3 Econometric Analysis: There are four objectives in this study. In this section findings of these four objectives are discussed. They are presented as follows:

5.3.1 Results of Zonal Travel Cost Method (ZTCM)

(A) Estimation of Trip Generation Function

The OLS regression is used to estimate the trip generating function (TGF) or demand function in this study. At first in the TGF various socio-economic characteristics of the visitors (such as average household income, average travel cost, average age, average educational level, sex and average family size) are taken as independent variables, but all these variables are not significant. In the final regression model only those variables are kept which have significant affect on the visitation rate. Log-log form is used to estimate the TGF and estimates of three different alternative forms are shown in Table 5.13. The TGF takes the following form

$$\ln \boldsymbol{VR} = 30.37 - 2.3208\,(\ln \boldsymbol{ATC}) + 0.0000197(\boldsymbol{AHI}) - 0.1466(\boldsymbol{AGE})$$

From this equation it can be easily concluded that there is an inverse relationship between travel costs of a particular trip and visitation rate (VR), which reflects the law

of demand. It also reflects that average household income of the visitors positively affects the VR and average age negatively affects it.

Table 5.13 The OLS Estimation of the TGF

Variables	Linear Model		Semi-Log Model		Double Log Model	
	Coefficient	**t-value**	**Coefficient**	**t-value**	**Coefficient**	**t-value**
Constant	16713.0724	5.1223*	24.7186	4.553*	30.3701	30.993*
In TC	0.0212	0.3432	-0.0000246	-0.2387	-2.3208	-11.5069*
HHI	-0.0209	-0.6942	-0.0000195	-.3896	0.0000197	4.2769*
AGE	-336.1971	-4.8097*	-0.4047	-3.4794	-0.1466	-4.8969*
R^2	0.87		0.88		0.99	
Adj. R^2	0.78		0.79		0.97	
F	9.69		10.28		389.19	

*significant at 1% level of significance

Source: Author's Calculation based on selected sample of tourists in KNP Jan-Feb, 2011.

(B) Consumer Surplus Estimation

The estimated consumer surplus for the different eight zones is shown in Table 5.14 and summing up these surpluses give the value of recreational services of Kaziranga National Park due to the visitors of the park. The estimated total consumer surplus is INR 3.21 million and this estimate shows value of the benefits that the visitors derived from visiting the park.

Table 5.14 Estimation of Consumer Surplus

Sl. No	Zones	Choke Price (in INR)	Consumer Surplus (per 100000 population) (in INR)	Consumer Surplus per person (in INR)	Total Visitor of the Park in 2010-2011	Consumer Surplus for the Visitors of 2010-11 (in INR)
1	**Upper Assam**	35789.6	2536031.1	25.36	25140	637550.4
2	**Lower Assam**	37601.81	2853956	28.54	18240	520569.6
3	**Middle Assam**	43036.06	5811127.8	58.11	32496	1888342.56
4	**South Assam**	23187.25	478436.15	4.78	228	1089.84
5	**NER States excluding Assam**	29384.81	1010562.8	10.11	3216	32513.76
6	**West Bengal**	37053.17	525333.73	5.25	21264	111636
7	**Other States of India**	31841.47	137420.21	1.37	8172	11195.64
8	**Foreigners**	124030.63	222761.23	2.23	4044	9018.12
Total					1,12,800	3211915.92

Source: Author's Calculation based on selected sample of tourists in KNP Jan-Feb, 2011.

This surplus also indicates the amount that the visitors are willing to pay over their actual cost to participate in the recreational activities of the National Park. By summing up the total consumer surplus and the total actual travel cost of visit, the total recreational value of the park can be estimated. The total recreational value of the Kaziranga National Park (shown in Table 5.15) is calculated around INR 764.59 million.

Table 5.15 Estimation of the Total Recreational Value of KNP

Sl. No	Zones	Consumer Surplus per person (1) (in INR)	Total Travel Cost per Person (2) (in INR)	Total Visitor of the Park in 2010-2011 (3)	Total Recreational Value [{(1)+(2)}x(3)] (in millions INR)
1	**Upper Assam**	**25.36**	**2402.05**	**25140**	**61.03**
2	**Lower Assam**	28.54	2399.41	18240	44.29
3	**Middle Assam**	58.11	1791.37	32496	60.1
4	**South Assam**	4.78	3766.67	228	0.86
5	**NER States excluding Assam**	10.11	3334.55	3216	10.76
6	**West Bengal**	5.25	7756.67	21264	165.05
7	**Other States of India**	1.37	13528.65	8172	110.57
8	**Foreigners**	2.23	77132.8	4044	311.93
Total				1,12,800	764.59

Source: Author's Calculation based on selected sample of tourists in KNP Jan-Feb, 2011.

(C) Revenue Maximization Entry Fee Estimation

The park authority of KNP introduced two different types of entry fees for visiting the park at present and authority collect INR 20.00 from Indian visitors and from foreigners INR 250.00. By introducing these two different levels of entry fee the authority collects INR 3.18 million revenues in 2010-2011, which is suboptimal because the visitor's willingness to pay is much more than their actual expenses. With the help of the Travel Cost Method, it is possible to estimate an entry fee for the Park that can maximize

revenue collection for the authority. By changing the per capita travel cost (representing equal changes in entry fee) in the TGF, we get sets of estimated number of visitors corresponding to different entry fees and this generates a demand curve for visits KNP. At the mid-point of the demand curve total revenue is maximum. The estimated number of visitors against various entry fee levels is shown in the Figure 5.6 assuming that the park authority have not introduced any entry fee for visiting the park at present. It is thus found that INR 187.6 per visitor per day can be increased by the park authority over and above the current level of entry fee to maximize revenue collection. By introducing these new levels of entry fees the authority can collect INR 24.3 million [{(250.00+187.60)×4044}+{(20.00+187.60)×108756}] as revenue which is far higher than the current level of revenue collection.

Here INR 250.00 is the entry fee for foreigners, INR 187.6 is the revenue maximizing entry fee and INR 20.00 is the entry fee for Indians. 4044 and 108756 are the annual total number of Foreigner visitors and Indian visitors respectively.

This additional amount of revenue can be used for preservation activities of the unique wild life of the park especially by technological up-gradation and by recruitment of zoologists, ecologists, veterinary doctors and armed security personnel. Finally it is evident from the demand schedule that by increasing the entry fee to the extent mentioned, tourists flow pressure to the park can be reduced to 0.06 million.

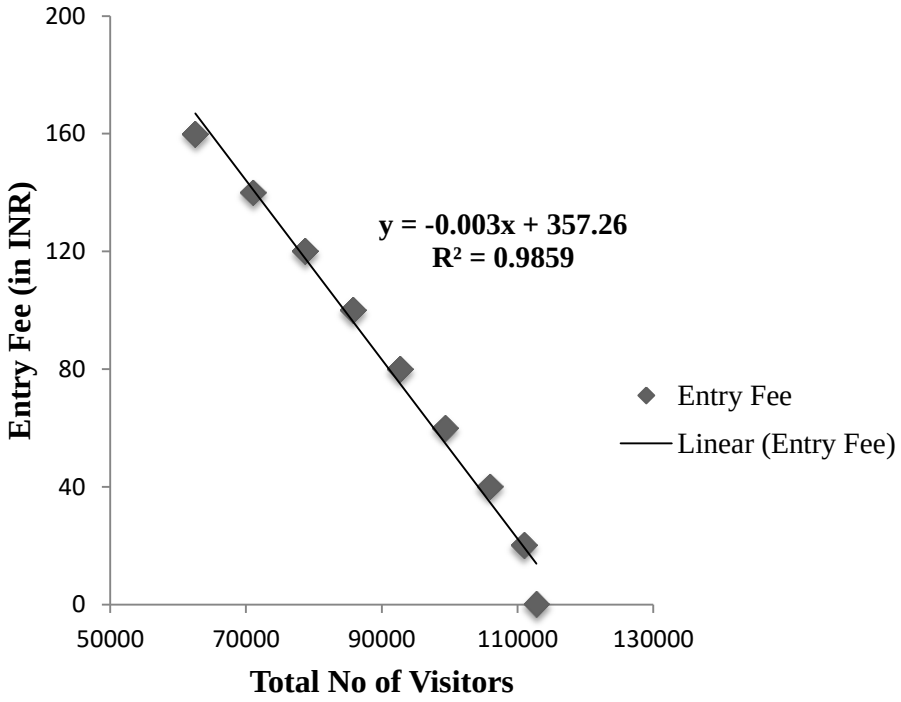


Figure 5.6 Estimation of Revenue Maximization Entry Fee for KNP

5.3.2 Results of DC Type of Contingent Valuation Method (DCCVM)

To estimate WTP for preservation of KNP or economic value of the park, dichotomous choice of contingent valuation method is used. From Figure 5.2, it is found that 84.8 percent of the total sample wants to contribute some amount for preservation of KNP. In this analysis only those visitors are considered who want to contribute for conservation of the park. The information which is collected from the visitors is cross sectional data.

(A) Correlation Analysis

To have an idea about the nature and degree of association/relationship between WTP of the visitors and selected explanatory variables employed in the analysis, Pearson's correlation estimation is carried out and the resulting correlation coefficient values are depicted in the Table 5.16. The findings of this Table are as follows:

(1) Willingness to pay is highly correlated with the bid amount and slightly correlated with the monthly household income, educational level, age and family size of the respondent.

(2) It is also found that (a) education level and monthly household income is positively correlated (0.225), (b) age is positively correlated with bid amount (0.2) and negatively with education level (-0.139), (c) family size of the respondent is negatively correlated with monthly household income (-0.431) and education level (-0.374). Observing all these correlation coefficient estimates, it can be concluded that all these explanatory variables are not highly correlated and so there is no multicollinearity problem in the regression model.

The correlation analysis revealed that bid amount, monthly household income, education level, age and family size is significantly correlated with WTP, but correlation does not necessarily imply that there is cause and effect relationships between the variables. So, taking WTP as the dependent variable and the other variables as independent variable regression analysis has been carried out to check exactly which socio demographic variable determines WTP of the respondents.

Table 5.16 Bivariate Correlation between the Variables

		WTP	BID	AHI	EDU	AGE	FAMSZ
WTP	**Pearson Correlation**	1	0	0	0	0	0
	Sig. (2-tailed)						
BID	**Pearson Correlation**	-.533(**)	1				
	Sig. (2-tailed)	.000					
AHI	**Pearson Correlation**	.215(**)	.036	1			
	Sig. (2-tailed)	.002	.620				
EDU	**Pearson Correlation**	.320(**)	-.132	.225(**)	1		
	Sig. (2-tailed)	.000	.065	.002			
AGE	**Pearson Correlation**	-.222(**)	.200(**)	.081	-.139(*)	1	
	Sig. (2-tailed)	.002	.005	.263	.043		
FAMSZ	**Pearson Correlation**	-.261(**)	.115	-.431(**)	-.374(**)	-.008	1
	Sig. (2-tailed)	.000	.108	.000	.000	.912	

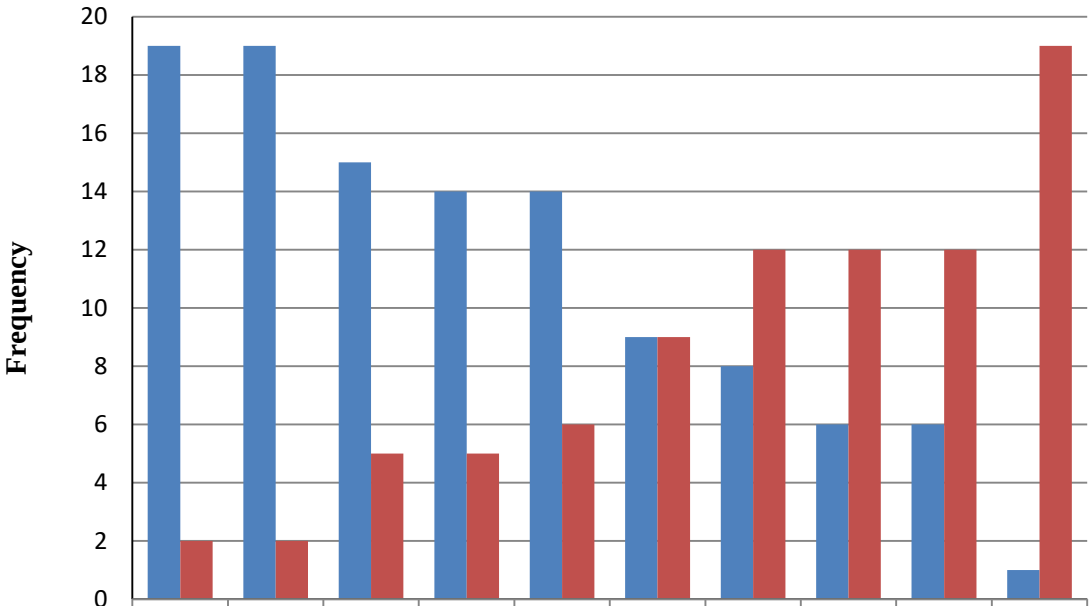
** and *Correlations are significant at the 0.01 level and 0.05 level (2-tailed).
Source: Author's Calculation based on selected sample of tourists in KNP Jan-Feb, 2011.

(B) Responses to Different Bid Levels

In dichotomous choice of CV method ten different level of bid amounts are offered to the respondents randomly and acceptance of these bid amounts by the visitors are shown in the Figure 5.7 and found that as the bid amount increases, acceptance of these

amounts by the visitors' decreases or there is an inverse relationship between these variables.

Fig 5.7 Responces to Different Bid Levels



	10	20	30	40	50	60	70	80	90	100
Pay	19	19	15	14	14	9	8	6	6	1
Not Pay	2	2	5	5	6	9	12	12	12	19

Source: Author's Calculation based on selected sample of tourists in KNP Jan-Feb, 2011.

(C) Estimation of the Logit Model

To estimate mean willingness to pay (WTP) for protection and conservation of the Kaziranga National Park, Logit model is used in the study and the descriptive statistics

and estimates of this model are shown in Table 5.17 and Table 5.18. The functional form of this model looks like

$$\boldsymbol{Logit(Y)} = 2.6081963 - 0.052678\boldsymbol{BID} + 0.0000129\boldsymbol{HHI} + 0.519468\boldsymbol{EDU} - 0.0415978\boldsymbol{AGE} - 0.1530636\boldsymbol{FAMSZ} + 0.1477242\boldsymbol{EXP} + 0.3268148\boldsymbol{SEX}$$

The findings of this model are as follows:

1. It is found that mean WTP for preservation of KNP is INR 49.5 (= -2.6081963/ -0.052678) by using the formula, Mean WTP = Intercept/coefficient of the bid amount. And the estimated economic value of the park is INR 5.58 million.

Table 5.17 Descriptive Statistics

Variables	Observations	Mean	Std. Dev.	Minimum	Maximum
Prob. Of WTP	195	0.5692308	0.4964585	0	1
BID	195	54	29.08218	10	100
HHI	195	63487.18	41596.91	15,000	350,000
EDU	195	5.010256	0.9360464	2	6
AGE	195	42.2461	9.805896	24	76
FAMSZ	195	4.42051	1.338406	1	7
EXP	195	0.5692308	0.4964585	0	1
SEX	195	0.6666667	0.4726179	0	1

Source: Author's Calculation based on selected sample of tourists in KNP Jan-Feb, 2011.

Table 5.18 Estimates of Logit Model

Prob. Of WTP	Coefficient	Std. Err.	z	P>|z|	[95% Conf. Interval]
BID	-0.052678	0.0083579	-6.06**	0.000	-.0670591 -.0342969
HHI	0.0000129	5.92e-06	2.35**	0.019	2.31e-06 .0000255
EDU	0.519468	0.2368804	2.45**	0.014	.1151909 .043745
AGE	-0.0415978	0.020938	-1.99*	0.047	-.0826355 -.00056
FAMSZ	-0.1530636	0.1812279	-0.84	0.398	-.5082638 .2021366
EXP	0.1477242	0.4230977	0.47	0.640	-.6315322 1.02698
SEX	0.3268148	0.4422268	0.85	0.394	-.4899338 1.243563
CONS	2.6081963	1.998969	0.70	0.484	-2.520353 5.315463
Number of observations = 195				**Log likelihood** = -86.679269	
LR chi2(7) = 93.22				**Pseudo R2** = 0.3497	
Prob > chi2 = 0.0000					

**and* indicates significant at 1% and 5% level of significance
Source: Author's Calculation based on selected sample of tourists in KNP Jan-Feb, 2011.

2. In this model the offered bid amount, household income, education level and age of the respondent significantly affects the decision regarding acceptance of the offered bid amount. But experience of the trip and sex of the visitors do not significantly affect it.

3. The bid amount negatively affects the probability of accepting the offered amount, means as bid amount increases the probability of accepting the particular offered amount decreases.

4. Household income and education level of the tourists positively affects WTP. As household income and education level increases the possibility of accepting a higher amount of bid also increases.

5. As age of the respondent increases possibility of paying a higher amount of donation for preservation of the park decreases, i.e., age of the visitor negatively affects the amount of WTP. Arguably, the more aged persons have lower incomes as they are on pension, have greater responsibilities and liabilities in a family and have more experience regarding corruption. These factors may explain why the aged persons want to contribute lesser amounts for conservation of KNP.

5.3.3 Results of Open Ended CV Method (OPCVM)

To estimate the maximum level of WTP for preservation of KNP, only those visitors are considered those who want to contribute some amount. And from Figure 5.2, it is found that 84.8 percent of the visitors want to pay some amount for the preservation purposes and for this reason only these tourists are taken as observations in this analysis.

(A) Correlation Analysis

Pearson's correlation coefficient estimation is also carried out to show the nature and degree of relationship between maximum WTP amount and various socio economic characteristics of the visitors, as well as among these socio demographic variables. Pearson's correlation coefficient matrix is depicted in Table 5.19 and findings of this table are as follows:

1. Maximum willingness to pay (WTP) amount is slightly correlated with monthly household income, education level, age and family size of the visitors. From these correlation estimates the cause and effect relationship is not clear, so regression analysis

is used to determine affects of these variables on maximum WTP amount for preservation of the park.

Table 5.19 Correlation Matrix

		Maximum Willingness to Pay	Monthly Household Income	Education Level	Age	Family Size
Maximum Willingness to Pay	**Pear. Corr.**	1				
	Sig.(2-tailed)					
Monthly Household Income	**Pearson Correlation**	.415(**)	1			
	Sig. (2-tailed)	.000				
Education Level	**Pearson Correlation**	.388(**)	.335(**)	1		
	Sig. (2-tailed)	.000	.000			
Age	**Pearson Correlation**	-.362(**)	.081	-.178(*)	1	
	Sig. (2-tailed)	.000	.263	.013		
Family Size	**Pearson Correlation**	-.351(**)	-.431(**)	-.382(**)	-.008	1
	Sig. (2-tailed)	.000	.000	.000	.912	

** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).
Source: Author's Calculation based on selected sample of tourists in KNP Jan-Feb, 2011.

2. Education level is positively correlated with monthly household income (0.335), age is negatively correlated with education level (-0.178), and family size is negatively correlated with monthly household income (-0.431) and education level (-0.382) of the respondents. From these correlation coefficient estimates, it can be concluded that all these variables are slightly correlated with each other and multicollinearity problem is absent in this analysis.

(B) ***Estimation of Maximum WTP for Preservation of KNP***

OLS regression analysis is used to estimate average level of maximum WTP amount and to determine the affects of socio demographic variables on maximum WTP. The results of this analysis are shown in Table 5.20 and in Table 5.21. The functional relationship takes the following form:

$$\boldsymbol{Max\ WTP} = 65.538 + 0.0001\boldsymbol{HHI} + 4.373\boldsymbol{EDU} - 1.010\boldsymbol{AGE} - 2.441\boldsymbol{FAMSZ} + 8.454\boldsymbol{EXP} + 0.356\boldsymbol{SEX}$$

The findings of this analysis are as follows:

1. From Table 5.21, it is found that monthly household income, education level of the respondents positively and age of the visitors negatively affects maximum level of WTP amount for preservation of the park. The visitors who belong to those households having higher monthly income and more educated have a greater possibility of donating higher amounts of money for preservation of KNP. The experience of the trip also positively affects maximum amount of WTP. Therefore the Government should adopt

various initiatives to provide better facilities to the tourists in the park and conservation of unique wildlife and biodiversity of the park, because those visitors who have seen more wild animals in KNP and got better facilities or well responses from Government persons are more satisfied during their trip and their WTP is higher than that of the dissatisfied ones.

Table 5.20 Descriptive Statistics Maximum WTP

	N	Minimum	Maximum	Mean	Std. Deviation
Maximum Willingness to Pay	195	10	150	51.97	27.547
Monthly Household Income	195	15000	350000	63487.18	41596.907
Education Level	195	2	6	5.01	.936
Age	195	24	76	42.25	9.806
Family Size	195	1	7	4.42	1.338
Experience	195	0	1	.57	.496
Sex	195	0	1	.67	.473

Source: Author's Calculation based on selected sample of tourists in KNP Jan-Feb, 2011.

Age of the visitors negatively affects WTP amounts because aged tourists do not want to visit the park again (from Table 5.11) and they have more experience regarding corruption and so their WTP for conservation purposes is also low. Family size of the

tourists is also negatively affects WTP amounts. As family size decreases possibility of paying higher amounts for preservation purposes increases.

Table 5.21 Estimates of Maximum WTP

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta	B	Std. Error
(Constant)	65.538	15.713		4.171***	0.000
Monthly Household Income	0.0001	0.000	0.308	4.726***	0.000
Education Level	4.373	1.883	0.149	2.322**	0.021
Age	-1.010	0.163	-0.360	-6.190***	0.000
Family Size	-2.441	1.372	-0.119	-1.779*	0.077
Experience	8.454	3.314	0.152	2.551**	0.012
Sex	0.356	3.324	0.006	0.107	0.915
R^2 = 0.401			**F** = 21.007***		0.000
Adjusted R^2 = 0.382			**-**		

Dependent Variable: Maximum Willingness to Pay
*****, **** and ***** shows significant at 1%, 5% and 10% level of significance
Source: Author's Calculation based on selected sample of tourists in KNP Jan-Feb, 2011.

2. From Table 5.20 it is found that average level of maximum WTP is INR 51.97 and economic value of the park is INR 5.86 million.

3. The R^2 value for the regression model is 0.4 and it is considered quite acceptable, because Mitchell and Carson (1989) and O'Garra (2009) mentioned that regressions on CV data usually yield R^2 values between 10% and 40%.

5.3.4 Economic Value of KNP in the Absence of Rhinos

Two different hypothetical environmental situations or conditions of the park are constructed and put in front of the visitors: one situation is the present situation. Another situation is in which all the rhinoceros are killed by poachers and tourist's willingness to pay is estimated in these two different alternative situations of the park. At the present scenario tourist's WTP for conservation of the park is shown in Table 5.20 and Table 5.21 and it is found that WTP of the visitors is INR 51.97 and estimated economic value of the park is INR 5.86 million. The estimates of WTP for conservation purposes in the second scenario of the park are shown in Table 5.22 and Table 5.23. From the Table 5.23, it is found that all the socio economic variables of visitors affects in the same way as in the present situation/condition regarding WTP for conservation of the national park.

Table 5.22 Descriptive Statistics of WTP without Rhinoceros

	N	Minimum	Maximum	Mean	Std. Deviation
Willingness to Pay without Rhinoceros	195	5	100	28.28	21.168
Monthly Household Income	195	15000	350000	63487.18	41596.907
Education Level	195	2	6	5.01	.936
Age	195	24	76	42.25	9.806
Family Size	195	1	7	4.42	1.338
Experience of the Trip	195	0	1	.57	.496
Sex	195	0	1	.67	.473

Source: Author's Calculation based on selected sample of tourists in KNP Jan-Feb, 2011.

Table 5.23 Estimates of WTP without Rhinoceros

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta	B	Std. Error
1	(Constant)	50.013	11.098		4.506**	.000
	Monthly Household Income	.000	.000	.334	5.577**	.000
	Education Level	3.614	1.330	.160	2.718**	.007
	Age	-.768	.115	-.356	-6.660**	.000
	Family Size	-2.479	.969	-.157	-2.558*	.011
	Experience of the Trip	8.495	2.340	.199	3.630**	.000
	Sex	1.394	2.348	.031	.594	.553
	R^2 = 0.494			F = 30.623**		.000
	Adjusted R^2 = 0.478			-		

Dependent Variable: Willingness to Pay without Rhinoceros
** and * depicts significant at 1% and 5% level of significance
Source: Author's Calculation based on selected sample of tourists in KNP Jan-Feb, 2011.

It is also found that tourists want to contribute a smaller amount of money in the second situation as compared to the present situation of the national park. Further in the absence of one horned rhinoceros in KNP, average level of WTP of the sample of tourist's is estimated at INR 28.28 (Table 5.22) and economic value of the park is found INR 3.19 million. The difference between these two WTP amounts reflects the amount of contribution for one horned Indian rhinoceros and the figure turns out to INR 23.69 per visitor per visit/entry. By comparing these two alternative situations it can be concluded that economic value of KNP is reduced by INR 2.67 million, if the

Government fails to conserve this unique wild animal of the national park. It also reflects the existence value of one horned Indian rhinoceros in KNP.

5.3.5 Comparison of WTP Estimates

In the present study willingness to pay amount for protection and conservation of Kaziranga National Park is estimated by using three different non-market valuation methods and they are zonal travel cost method (ZTCM), dichotomous choice of contingent valuation method (DCCVM) and open ended contingent valuation method (OPCVM). In developed countries lots of studies have been carried out to test the reliability of CV methods and most of these studies got almost similar results (Choe at al., 1996; Loomis, 1989). The estimate of CVM is very much dependent on methodological issues like elicitation format, payment vehicle, bid amount, type of functional form and statistical analysis employed (Rolfe and Dyack, 2007). These types of comparative studies are much rare in India and only two such studies have been found. But the results of these two studies are not similar. In one of them CVM estimates give higher amount of WTP than that of the TCM (Rai at al., 2000) and other gives the opposite results (Chaudhary and Tewari, 2006). From ZTCM it is found that estimated total consumer surplus is INR 3.21 million for KNP and this surplus indicates the amount that the visitors are willing to pay over their actual cost to participate in recreational activities of the National Park. Mean WTP for preservation of KNP is found INR 49.5 and INR 51.97 by using dichotomous type and open ended contingent valuation methods respectively and estimated economic value of the park is INR 5.58 million and INR 5.86 million respectively. So it can be concluded that both the CV

methods give almost similar results regarding WTP estimate, but estimate of ZTCM is smaller than that of the CVM. This happens mainly for three reasons:

Firstly, ZTCM captures only indirect use value of the park, but in CV method decisions regarding WTP is not only affected by indirect use value but also by option value and bequest value (Figure 1.2).

Secondly, visitors took decisions at two different points of time regarding expenditure for the trip to KNP and how much they are willing to contribute for preservation of the park. The interview was conducted at the Jeep (a four wheeler MUV) safari stand (or terminus) just after the tourists were coming back from a better or desired environmental situation, i.e., after viewing or enjoying wild life and natural beauty of the park (most of them have enjoyed this type of aesthetic pleasure for the first time in his/her life). It is thus quite likely that during that particular point in time they would probably want to contribute larger amount of money for preservation of KNP in contrast with some other kind of situation at a different time point.

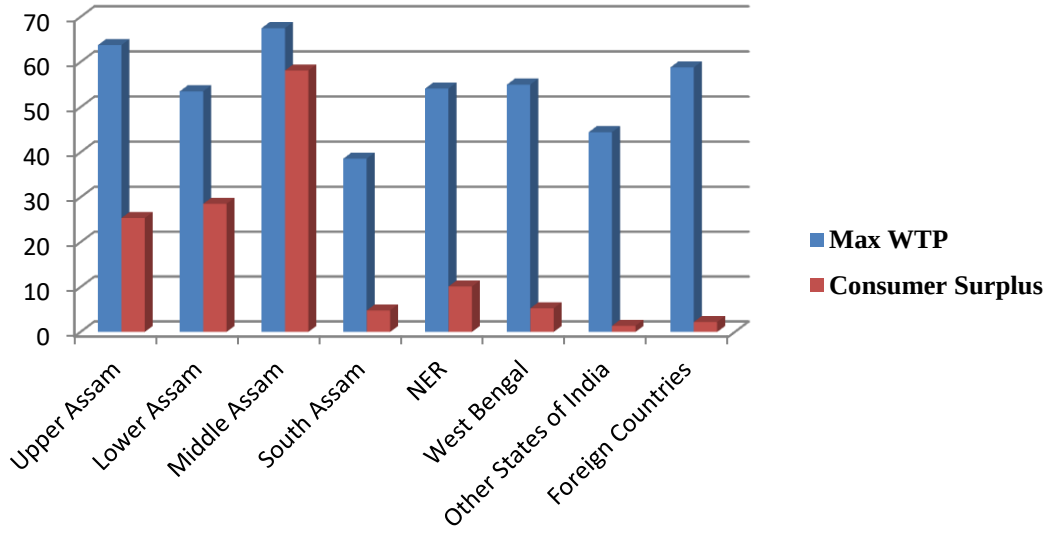
Thirdly, single-site travel cost models produce lower estimates than the multiple-site models (Carson, at. al, 1996). This is because many single site travel cost models do not include any value for travel time while most multiple site travel cost models make some allowance for travel time costs.

5.3.6 Convergent Validity Test of CVM Estimates

The estimates of CVM method are calculated in a hypothetical market situation. The CV estimates vary with the treatment of outliers and protest responses, the functional form used with discrete choice CV data, and the payment mechanism used (Carson at. al., 1996). CV estimates are undoubtedly sensitive to how well the good is described and whether the respondents believe the good can be provided (Mitchell and Carson 1989). To test the reliability of CVM estimates in the present study, convergent validity test is carried out. At first, comparison between the estimates of zonal travel cost method (ZTCM) and CVM is conducted. It is found that the ratio between the estimates of dichotomous choice of CVM (DCCVM) and ZTCM is around 1.7 and between the estimates of open ended CVM (OECVM) and ZTCM is almost 1.8. Most of the studies during 1966 to 1994 period have found that the ratio between the Contingent Valuation Estimate and the Revealed Preference (RP) Estimate is less than 2 (Carson et. al., 1996).

Carson *et. al.* (1996) have estimated the correlation coefficient of estimates of CV and RP methods across 616 studies and found that Pearson correlation coefficients are 0.83 (for the complete sample), 0.91 (for the trimmed sample) and 0.98 (for the weighted sample) and in all three datasets, Pearson correlation coefficient are significantly different from zero ***(p*** < 0.001). The correlation coefficient of the estimates of CVM and ZTCM is also estimated in this study. DC type of CVM and OE type of CVM give almost similar results, so for simplicity only the estimates of OE type of CVM and ZTCM are considered to estimate correlation coefficient of these two estimates.

Figure 5.8 Maximum WTP and Consumer Surplus According to Origin



Source: Author's Calculation based on selected sample of tourists in KNP Jan-Feb, 2011.

Table 5.24 Bivariate Correlation between the Variables

		Avg MaxWTP	CS
Avg MaxWTP	Pearson Correlation	1	
	Sig. (2-tailed)		
	N	8	
CS	Pearson Correlation	.680(*)	1
	Sig. (2-tailed)	.048	
	N	8	8

* Correlation is significant at the 0.05 level (2-tailed).

Source: Author's Calculation based on selected sample of tourists in KNP Jan-Feb, 2011.

For this purpose average level of maximum willingness to pay (WTP) is estimated according to the 8 different zones because consumer surplus (CS) is already estimated according to the different 8 zones (Figure 5.8). Then Pearson correlation coefficient analysis is carried out (Table 5.24) and found that these two estimates are highly correlated (0.68) at 95% level of significance and suggest that if ZTCM estimates are systematically varying across different zones with the nature of the good being valued, then OP type of CV estimates are also changed in the same direction or vice versa.

5.3.7 Results regarding Willingness to Visit KNP Again

This analysis is carried out to show how the decision of tourists regarding willingness to visit again the park is affected by their various socio economic characteristics. It is already found that only 42% of total sample tourists want to visit KNP once again.

(A) Correlation Analysis

Before carrying out regression analysis Pearson's correlation coefficient is estimated to show the nature and degree of relationship between willingness to visit again the park and various socio economic characteristics of the visitors, as well as among these socio demographic variables. Pearson's correlation coefficient matrix is depicted in Table 5.25 and findings of this table are as follows:

1. Possibility of visiting the park again is positively correlated with monthly household income and education level of the respondents, but it is negatively correlated with travel cost per person of the trip, age and family size of the respondent.

Table 5.25 Pearson's correlation Matrix

		Probability of Visit Again	Travel Cost per Person	Monthly Household Income	Age	Educational Level	Family Size
Probability of Visit Again	**Pearson Correlation**	1					
	Sig. (2-tailed)						
Travel Cost per Person	**Pearson Correlation**	-.243(**)	1				
	Sig. (2-tailed)	.000					
Monthly Household Income	**Pearson Correlation**	.068(**)	.314(**)	1			
	Sig. (2-tailed)	.000	.000				
Age	**Pearson Correlation**	-.365(**)	.282(**)	.213(**)	1		
	Sig. (2-tailed)	.000	.000	.001			
Educational Level	**Pearson Correlation**	.089(*)	.212(**)	.158(*)	.112	1	
	Sig. (2-tailed)	.014	.001	.016	.090		
Family Size	**Pearson Correlation**	-.215(**)	-.264(**)	-.309(**)	-.279(**)	-.159(*)	1
	Sig. (2-tailed)	.001	.000	.000	.000	.016	

** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).
Source: Author's Calculation based on selected sample of tourists in KNP Jan-Feb, 2011.

2. Monthly household income is positively correlated with travel cost (0.314), age is positively correlated with travel cost (0.282) and monthly household income (0.213), education level of the respondents is positively correlated with travel cost of the trip (0.212) and monthly household income (0.158), family size of the visitors are negatively correlated with travel cost of the trip (-0.264), monthly household income (-0.309), age (-0.279) and educational level of the respondents (-0.159). From all these

correlation coefficient estimates it can be concluded that these variables are not highly correlated and so there is no multicollinearity problem in the data set.

(B) Estimation of Willingness to Visit Again

The estimates of Probit model are depicted in Table 5.26 and descriptive statistics of the model is shown in Table 5.27. The model takes the following form:

$$\boldsymbol{Probit}(\boldsymbol{Y}) = 1.657471 - 0.0002893\boldsymbol{TC} + 0.0000211\boldsymbol{HHI} - 0.0588824\boldsymbol{AGE} + 0\ .0497452\boldsymbol{SEX} + 0.2525754\boldsymbol{EDU} - 0.118834\boldsymbol{FAMSZ} + 0\ .2972439\boldsymbol{EXP}$$

Table 5.26 Estimates of Probit Model

Willingness to Visit	Coefficients	Standard Error	Z	P>|z|	[95% Conf. Interval]
Per Capita Travel Cost	-.0002893	.0000584	-4.96**	0.000	-.0004037 -.0001749
Monthly Household Income	.0000211	4.39e-06	4.82**	0.000	.0000125 .0000298
Age	-.0588824	.0123029	-4.79**	0.000	-.0829957 -.0347691
Sex	.0497452	.213976	0.23	0.816	-.4691305 .3696401
Educational Level	.2525754	.0962017	2.63**	0.009	.0640235 .4411274
Family Size	-.118834	.10274	-1.16	0.247	-.3202007 .0825327
Experience	.2972439	.1998981	1.49	0.137	.6890369 -.0945491
Constant	1.657471	.900738	1.84*	0.066	-.1079431 3.422885
Number of observations = 230			**LR chi^2(7)** = 97.39		
Log likelihood = -107.57485			**Prob. > chi2** = 0.0000		
Pseudo R^2 = 0.3116					

****** and ***** denotes significant at 1% and 10% level of significance.
Source: Author's Calculation based on selected sample of tourists in KNP Jan-Feb, 2011

Where, Probit(Y) depicts possibility of visiting the park again. The findings of the Probit model is as follows:

1. Travel costs of the trip and age of the respondents negatively affects possibility to visit the park again. As travel cost and age increases possibility of visiting the park again decreases.

2. Monthly household income and education level of visitors positively affects the decision regarding willingness to visit KNP again. The visitors who belong to those households having higher monthly income and have more number of educated persons have a greater possibility of visiting the park again.

Table 5.27 Descriptive Statistics of the Probit Model

	N	Minimum	Maximum	Mean	Std. Deviation
Probability of Visit Again	230	0	1	.42	.494
Travel Cost per Person	230	600.00	133856.00	7404.4217	16628.69619
Monthly Household Income	230	15000	350000	62673.91	49571.550
Age	230	24	76	43.13	9.866
Sex	230	0	1	.66	.474
Educational Level	230	2	6	4.90	1.015
Family Size	230	1	9	4.22	1.222
Experience	230	0	1	.55	.498

Source: Author's Calculation based on selected sample of tourists in KNP Jan-Feb, 2011.

Chapter 6

6.1 Introduction

In this chapter, suggestions and conclusions have been drawn on the basis of the analysis of collected primary data from the tourists of Kaziranga National Park.

6.2 Suggestions and Policy Implications

The main objective of this study is to estimate the amount of willing to pay for preservation of Kaziranga National Park. Travel cost and contingent valuation methods are used to estimate this WTP amount and necessary data are collected from the tourists of the park. These estimates help the policy makers in framing proper decision and policies for protection and preservation of the national park.

The estimated consumer surplus is approximately INR 3.21 millions, which is found from zonal travel cost method. It is found that the economic value of the park is approximately INR 5.58 million and INR 5.86 million using dichotomous choice and open ended contingent valuation methods respectively. Keeping in view the large amount of consumer surplus and recreational or economic value of the park, the

Government of India and State Government of Assam should allocate large budgetary resources for preservation of the park.

In Kaziranga National Park, two different entry fees are collected from the visitors – INR 20.00 is collected from Indian visitors and INR 250.00 is collected from the foreigners. But these entry fees are not optimum because the visitors want to contribute over and above their actual expenses for preservation of the park. So the authority of the park can increase the entry fee to an optimum level and this optimum level may or may not be the revenue maximization entry fee. The present study focuses on the revenue maximizing entry fee. If the park authority introduces the revenue maximization entry fee, then it helps in generation of an additional amount of revenue. This additional revenue can be used in solving various maintenance related problems of the national park.

Firstly, in KNP tourist inflow pressure is increasing day by day and construction of hotels and lodges are also increased in a rapid pace to accommodate these increased tourists in the periphery of the southern boundary of the park and these constructions helps in destroying the ancient wild animal corridors, but the tourist flow pressure in other parks and sanctuaries of Assam is very poor. The other parks and sanctuaries of the North East also have their unique wildlife and biodiversity, but these are not famous among the tourists because of lack of promotion and proper advertising. If a well-crafted publicity campaign is conducted to promote eco-tourism side of these parks and sanctuaries, besides imposing a higher entry fee in KNP, a large chunk of visitors would think beyond Kaziranga and visit other parks and sanctuaries of Assam. By doing this

the Government can generate additional funds which can be used for preservation of the wildlife and biodiversity of other parks and sanctuaries of Assam. This would also help in development and promotion of tourism in Assam and consequently help in conservation of ancient wild animal corridors of KNP by reducing the tourists' inflow pressure to the park.

Secondly, poaching of wild animals is a major problem in front of the park authority and in many cases found that local people are directly or indirectly linked with poachers. The National Park authorities can form a special task force for conservation of wild animals by incorporating (involving) the local people and can give them various types of incentives, awards and remunerations for their performance or activities by means of this additional amount of revenue. This will help to generate productive employment for the local dwellers as well as reduce poaching in the park to a considerable extent.

Thirdly, the Government has given appointment to the home guards as forest guards in KNP and many of them have started leaving their jobs since 2011-12 because of irregular salary payment by the park authorities. The authority can solve this problem of revenue and fund crunch by raising the current level of entry fee so that the additional amount of revenues can also be used for paying salaries to the maintenance staff of the park. So, the Government should develop proper management policy for preservation of the park and for this purpose an optimum level of entry fee should be imposed on the visitors of the park. This entry fee may well be the revenue maximizing entry fee.

There are 23 villages in the neighborhood of the park and total population in the immediate neighborhood of the park is about 0.07 million according to the 2001 Census Report of India. But most of the people are marginal farmers and lie below the line of poverty. On the southern boundary of Kaziranga National Park, almost fifty private and public hotels and lodges are giving services to the visitors. But most of these lodges and hotels are not owned by local people. A very small number of local people are engaged in these hotels and lodges, working at low grade posts and receiving insufficient salaries. So the Government should take initiative in the formation of self-help groups among the people and should involve them in various types of tourism related activities. This will obviously reduce their dependency upon the park for fishing, firewood, etc. This would help in preservation of the ecosystem of KNP.

As far as recreation in KNP is concerned, there is mainly one option available to the visitors – that is viewing wild life in the Park. After going through elephant rides or Jeep safari for viewing wild animals, the tourists have little option for recreation in KNP. This is basically why most of the visitors have a tendency of staying only one day in the park besides making only one trip to KNP during his/her whole life time. An interesting geographical advantage of KNP is that the Brahmaputra river flows over the northern boundary and Karbi Anglong hills are situated near the southern boundary of the park. The Government can use these resources for recreation purposes by undertaking various types of investment programs. If the park authority takes various types of initiatives and introduces new types of recreational activities like angling in the Brahmaputra River, and hiking, rock climbing and mountain biking in the Karbi

Anglong hills, then larger number of tourists would be motivated or induced to spent more than one day in Kaziranga and their expenditure on various amenities would help to boost the local economy as well as the Government. If the local people are engaged in these newly introduced recreational activities, then it would also help in the improvement of the economic conditions of these peoples.

There are four established tea gardens besides the national park. The local inhabitants who are dependent on the tea gardens for their livelihood also have a unique culture. In other words the tea garden workers have a tradition of their own. Few people in the rest of India and the world have the opportunity of visiting tea gardens. Thus a tea garden visit would obviously be a natural attraction for many. If these tea gardens are opened for tourism purposes then it undoubtedly assist in up gradation of the economic status of the local people.

There is thus an urgent need to integrate the wildlife tourism with tea tourism and cultural tourism for the development of socio economic status of the local people. Most of the visitors from far-off places are from the creamy layer and consequently an outdoor eco-friendly game like golf could easily be popularized. So golf courses can also be developed within the periphery of these tea gardens and that would help in promoting golf tourism in Assam.

Inorganic pesticides and fertilizers are rampantly used in these tea gardens, but these types of agricultural practices are not eco-friendly. The use of pesticides and fertilizers in the tea gardens threaten the eco-system of the park (Misra, 2005). Many small

animals, birds and insects of the national park are dying due to the excessive use of pesticides and fertilizers. So the Government should provide various types of initiatives for the use of organic fertilizers and pesticides in these tea gardens for protection and conservation of the eco-system of KNP.

The tourist inflow pressure to KNP from foreign countries and from other states of India except Assam and West Bengal is very low. A very low number of visitors from southern part of Assam take trip to the national park. All these reflect that communication facilities are too poor in Assam. Most of the tourists from far-off places belong to higher income groups compared to the local tourists and so that they can bear a higher amount of travelling expense in making trip to KNP. Generally the local tourists use road and/or rail services and the foreign tourists and the visitors from distant places use air travel services in making trip to KNPs. In southern part of Assam the road and rail communication facilities are too poor, as a result the visitation rate is also small for this zone. The air travel infrastructure is not up to satisfactory levels in Assam. As a result tourists from far off places (availing air travel to come to Guwahati) have to travel around 239 km by road from Guwahati airport to KNP. The nearest airport, i.e., Roroiya airport of Jorhat district is also situated around 110 km away from the park and moreover flights are quite infrequent. Hence the central and state Governments should take various steps for the development of communication facilities in Assam.

The forest guards are not well equipped with arms and ammunition to fight against the poachers and smugglers in the park. They are performing their duties with the help of backdated and obsolete weapons. So to reduce poaching of wild animals in the park,

there is an urgent need for modernization of the forest department especially the security part. The Government should provide modern technologies besides modern arms and ammunition to the servicemen of the forest department in order to make them better equipped for park protection and maintenance.

Data for the last six years on visitors' inflow to the park reveals that nearly 5 percent of the total tourists are foreigners and sadly it has not grown during this time period. This is mainly because of terrorism and communication problem of Assam. So the Government should take various steps to solve these two problems of Assam.

Generally when tourists make a trip, then they want to buy some indigenous local products or handicrafts as a memento. If the local women are engaged in traditional handicraft making and allied activities through the SHG programmes, a market can develop on the periphery of the park where they can sell these handicrafts at a reasonably higher price to the visitors. This can help in up gradation of economic conditions of these poor local women and this also increases the participation of local women in social and economic activities.

As it is found that existence of one horned Indian rhinoceros have a great influence on the economic value of the park, but poaching of this wild animal is a great problem in KNP. The other wild animals also contribute a large amount to the economic value of the park. In order to protect and conserve these wild animals, the Government should implement new legislations very strictly. KNP is the homeland of one horned Indian rhinoceros and highest number (i.e., 2048 according to census report of KNP, 2009) of

these rhinoceroses are found in KNP. Around 90 percent of total rhino population is found in KNP and Pobitora Wildlife Sanctuary and remaining are found in Orang National Park. But Laokhowa Sanctuary, Manash and Dibru-Saikhowa National Parks are also suitable places for rehabilitation of rhinos because these parks and sanctuaries had a healthy rhino population till the 1980s (Assam Tribune, 22-03-2012). Hence this endangered species should be translocated to these other national parks and sanctuaries of Assam.

Before this translocation an experiment should be carried in the other National parks where this wild animal is to be translocated. This is to observe whether the environment of these parks can be considered as suitable habitats for the growth of rhinos. Moreover the security system in these parks should also be modernized for wildlife protection. This process obviously would help to restore and preserve this wild animal and also increase the tourist inflow pressures in other parks and wildlife sanctuaries of Assam. This process has got momentum under the Indian Rhino Vision 2020 (IRV 2020) and already 22 rhinos from KNP have been translocated to Manas National Park (Assam Tribune, 13-03-2012). On the southern boundary of the park, illegal migrants also create a problem for the park authority. So the Government should undertake proper management policies in this respect also.

Uses of plastic carry bags and other non-biodegradable materials like cans and bottles have been a global environmental concern in the 21st century. So with the objective of preservation of eco-system of KNP the Government should make legislations to restrict the use of these non-biodegradable materials and carry bags or disposables in the

periphery of the national park. Instead of using these non-biodegradable products the Government should provide incentives for the mass use of paper and pottery products especially in hotels or lodges or restaurants around the park, as because these products are biodegradable. Here the advantage is that Assam has a comparative advantage in making pottery products. It also helps in development of the '*Kumar*' (potters) community who are especially engaged in making these products.

If all the above mentioned suggestions are properly implemented, then the objective of sustainable eco-tourism can be certainly achieved in KNP.

6.3 Conclusions

National parks and wildlife sanctuaries have played an important role that balances the needs for biodiversity conservation against degradation of environmental conditions of different countries while keeping the rapid pace of development. Recently these parks are provided for recreational activities on leisure demands of the people. Due to increased recreational pressure and the consequent damage to the environment, the management of these parks comes under close scrutiny. So, it needs economic valuation. But the task is not straightforward since this kind of public service is not directly sold to visitors for a price. On the other hand, these environmental resources or services are characterized by non-excludability and externality. Due to these characteristics the market system cannot capture all aspects of these resources and these recreational services or biodiversity services are mispriced by the market. Therefore the policy makers should use a new valuation approach to assess the value of these

resources namely non-market valuation methods. Non-market valuation methods provide data and help the policy makers to take decisions on how best to manage the natural resources. Two common approaches to the non-market valuation are Travel Cost Method (TCM) and Contingent Valuation Method (CVM) generally used for assessing economic value of environmental resources. In the present study, both methods are used to estimate recreational value of the Kaziranga National Park (KNP). For this purpose 230 visitors are interviewed randomly using a structured schedule with a single respondent from each group or family chosen in the sample. Using Zonal Travel Cost Method, it is estimated that total consumer surplus is around INR 3.21 million and this surplus indicates the amount that the visitors are willing to pay over their actual cost to participate in the recreational activities of the national park. Average household income of the visitors positively affects the visitation rate (VR) and average travel costs of a particular trip and age negatively affects it.

National parks are established to preserve wildlife or biodiversity. But conservation often displaces local communities and has the potential of raising their distress levels. "Ecotourism" helps in conservation of natural resources or services and raises the standards of living of the local people. But unregulated tourism creates problems in preservation of the wildlife of public parks especially in developing countries. In recent years Kaziranga National Park has faced these problems and the park authority may possibly use revenue maximizing entry fee as an effective instrument. The Kaziranga National Park (KNP) has been suffering from over-exposure in recent years. The tourist inflow pressure is much higher in KNP as compared to the other national parks and

wildlife sanctuaries in Assam. The tourist inflow data of the last two years shows that more than 0.1 million visitors visit KNP per year, but in the other parks and sanctuaries tourists inflow pressure is less than even 0.05 million per annum. In the southern part of the Kaziranga National Park, almost fifty private and public hotels and lodges (there are only four Government lodges) have been constructed providing hospitality services to the visitors. However most of the hotels and lodges are not owned by the local people. The haphazard growth of tourism related infrastructure, especially unchecked expansion of tourism and hospitality industry on the southern boundary of the park, is blocking traditional wild animal corridors. The focus of government and other organizations should remain on the core aspect of establishment of the park (to keep KNP as a safe haven for wild-life) and not on pure commercial aspects like hotel construction to accommodate more tourists. Thus there is an urgent need for a strategic shift of policy on the part of the Tourism and Forest departments so that a segment of the tourist inflow can be diverted towards other parks and sanctuaries to lessen the pressure on KNP. It is found that the park authority can increase the entry fee to INR 187.60 from the current level of entry fee to maximize revenue collection and tourists inflow pressure to the park can be reduced to 0.06 million. By introducing this new level of entry fee the authority can collect INR 24.3 million revenues which are much higher than the current level of revenue collection and this additional amount of revenues can be used for management of the park.

It is found that 84 percent of the total sample visitors willingly want to contribute some amount of money for protection and conservation of KNP. Mean WTP for preservation

of KNP is INR 49.5 and INR 51.97 by using dichotomous type and open ended contingent valuation method and economic value of the park is estimated around INR 5.58 million and INR 5.86 million respectively. Monthly household income, educational level, experience of the trip of the visitors positively affects WTP for protection and conservation of KNP, and age and family size of the tourists negatively affects it. Both the CV methods give similar results regarding WTP estimate, but the estimate of ZTCM is smaller than that of the CVM, because decisions regarding WTP and expenditure for the trip are taken at two different point of time and ZTCM captures only Indirect use value, but CVM captures not only indirect use value but also bequest value. Convergent validity test is carried out to test the reliability of CV estimates.

Poaching of one horned Indian rhinoceros is a great problem in KNP and by using the open ended CVM, it is found that mean WTP for protection of this unique wild animal is around INR 23.69 and the value of the park is reduced by INR 2.67 million if poaching of this wild animal is continuously going on. It is found that around 42 percent of the total sample tourists want to visit the park again. Monthly household income and educational level of the visitors positively affect decision regarding willingness to visit KNP again and age and per capita travel cost of the tourists negatively affect it. Keeping in view the large amount of consumer surplus and recreational or economic value of the park, Government of India and Assam should allocate large budgetary resources for protection or conservation of KNP. So, the Government should develop and implement proper scientific management policy for preservation of the park. It is hoped that this study will pave the way for future research work in the field of valuation of

environmental resources, endangered species or animals and places of historic interest of not only the North East but throughout the rest of India.

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(A) List of Publications:

1. Bharali, A. (2011), 'Use of Contingent Valuation Method to Elicit Willingness-To-Pay for Preservation of the Kaziranga National Park'. In Nair, A.R. & Sumesh S.S.(Ed.), *Emerging Trends in Social Science Research and Methodological Challenges* (pp. 143-145), Chennai, Rajiv Gandhi National Institute of Youth Development (ISBN: 978-93-81572-05-4)

2. Bharali, A. & R. Mazumder (2012), 'Application of Travel Cost Method to Assess the Pricing Policy of Public Parks: The Case of Kaziranga National Park', *Journal of Regional Development and Planning*, 1(1), 44-52 (ISSN: Print- 2277-9094 & Web – 2277-9108)

3. Bharali, A. & R. Mazumder (2012), 'Estimating Recreational Value of the Land of Indian One Horned Rhinoceros', *Assam University Journal*, 7(1), 145-155 (ISSN 0973-4821)

4. Bharali, A. & R. Mazumder (2012), 'Travel Cost Analysis of a World Heritage Site: The Case of Kaziranga National Park'. In Roy, N. & R. Mandal (Ed.), *A Tapestry of Research in Economics in North East India* (pp. 180-192), Silchar, Assam University (ISBN: 978-81-908202-2-6)

(B) Presentation of Research Papers in Seminars and Conferences/Participation in Workshops:

Sl. No.	Workshop/ Seminar/ Conference	Organized by	Presentation/ Participation	Research Paper
1.	Conference	North Eastern Economic Association	Presentation	Travel Cost Analysis of a World Heritage Site: The Case of Kaziranga National Park
2.	National Seminar	Dibrugarh University Dibrugarh	Presentation	Inequality and Poverty among Schedule Castes in South Assam: A Case Study of South Assam
3.	International Seminar	Assam University and CCLP Worldwide	Presentation	Higher Education in North East India: Challenges and Opportunities
4.	Workshop (Introduction to Quantitative Environmental Economics)	SANDEE and OKDISCD	Participation	-
5.	Workshop (Research and Writing Workshop in Environmental Economics and Policies)	SANDEE and NEHU	Participation	-
6.	Workshop (Basic Statistics and Research Data Analysis)	MBA Dept., Assam University	Participation	-
7.	Workshop (Introduction to Statistical Analysis)	Dept. of Economics of Mizoram University and ISI, Kolkata	Participation	-
8.	National Workshop (Econometric Application on Cross Section & Time Series Analysis)	Department of Economics of Assam University and ICSSR	Participation	-

Appendix

Interview Schedule

Survey Schedule for Estimating Demand for Visits to Kaziranga National Park

SECTION A: Personal Information

(1) Name: ……

(2) What is your current permanent address (where you lived and worked before making the trip to Kaziranga National Park)?

Country: …… City: ……..

(3) Some personal details:

Age	Sex (Please tick)		Religion	Nationality
……years	M	F		

(4) Your highest educational qualification: (Please tick the appropriate box)

(a) Post-graduate and above	
(b) Graduate/Polytechnic	
(c) Higher Secondary	
(d) Secondary	
(e) Below Secondary	

(f) Primary & Illiterate	

(5) Your principal occupation: (Please tick the appropriate box)

(a) Salaried employee	
(b) Self employed (own manufacturing/trading enterprise)	
(c) Agriculture/Fishery	
(d) Professional (doctor/consultant/other)	
(e) Any other (Student/Retired Person/Housewife/Other)	

(6) Approximate monthly personal income in rupees: (Please tick the appropriate box)

Rs.0-Rs.10,000	Rs.10,000-Rs.20,000	Rs.20,000-Rs.50,000	Rs.50,000-Rs.100,000	Rs.100,000-Rs.200,000	Rs.200,000-Rs.500,000	>Rs.500,000

(7) Approximate monthly household income in rupees: (Please tick the appropriate box)

Rs.0-Rs.10,000	Rs.10,000-Rs.20,000	Rs.20,000-Rs.50,000	Rs.50,000-Rs.100,000	Rs.100,000-Rs.200,000	Rs.200,000-Rs.500,000	>Rs.500,000

(8) Number of members in household ……. and number of earning members of household ……

SECTION-B: Information on this particular tour

(1) Are you a frequent traveler?.....Yes/No

(2) (a) Purpose of taking trip to KNP? (Please tick the appropriate one)

(i) Official,

(ii) Educational tour,

(iii) Seeing the wildlife and biodiversity of the park,

(iv) Research and project,

(v) Picnic.

(b) Are you a first time visitor to KNP? .....Yes/No

(c) How many times have you visited KNP? .....

(d) If you are not a first time visitor, do you think KNP has became worsened or improved since your last visit (tick one)?

(i) Polluted/Degrades/Deteriorated,

(ii) The Same,

(iii) Improved.

(3) (a) With whom you have come to the KNP? (Please tick the correct box)

As a single person	With your family members/relatives/ office colleagues /friends.

(b) If you have not come as a single person in this trip, number of persons in your group/family. …….. [ ]

(4) Are you willing to visit KNP again? ……...Yes/No.

(5) How would you describe your experience of the Kaziranga National Park?

Better than I expected……..

As I expected ……

Worse than I expected…….

SECTION C: Information relating to tour costs and composition

(1) Duration of your stay in the Kaziranga National Park:

Date of your arrival in the park	Date of your departure from the park
……/……/…….	……../……../……

(2) Please write down your means of transportation from- your origin of trip to your accommodation in India (If your home is in India please skip this question, but fill in the underlying question)…….

-your accommodation in India to the Kaziranga National Park……...

……..

(3) (a) Give an estimate of your total travelling cost(air tickets, car rental, lodging, fooding, etc.), also include return, for travelling from your origin of the trip to Kaziranga National Park…… in currency……

(b) Give an estimate of the total cost (like elephant/safari ride, lodging and fooding, buying some local products, etc.) incurred locally in the National Park…….……in currency……

SECTION D: Information on the Willingness to Pay of the Tourists

"Kaziranga National Park is suitable for the growth and survival of unique and diverse wildlife and forest biodiversity. For our economic benefit we are destroying all the natural resources like the forest resources and wildlife without thinking about the future. It creates

many environmental problems. For this reason Government has introduced various policies to preserve the quality of the park and introduced the instruments like income tax, property tax, entry fee, etc. to collect the necessary funds to implement these policies, but the Government do not achieved the objectives of these policies till date. Remember that you have limited income and you have to do many personal works with this limited income. Suppose at this time a private agency or NGO comes forward to preserve the park and giving their services very efficiently and after visiting the park, the members of this organization ask you the following questions on willingness to pay (WTP) for protection and preservation of KNP. It is also mentioned that these amounts will be collected in the next month from the respondents.

(a) Do you think contribution for the maintenance of the park is important? ..... Yes/No

(b) Instead of your limited income, would you want to contribute any small amount for park maintenance? ..... Yes/No

(c) If yes, will you voluntarily contribute Rs. X for KNP maintenance above your actual expense? ……. Yes/No

(d) What is your maximum willingness to pay for preservation of the park above your actual expenses during the trip? …… Rs……

(e) Poaching of great Indian one horned rhinoceros in KNP is a great problem. Assume that all the rhinoceros of the park are killed by poachers and you have not seen any rhinoceros during the trip, then how much you want to contribute for conservation of KNP? …… Rs……

Thank you, Sir/Madam for your time and effort. Your responses will immensely help my research work.

Abinash Bharali

(Assam University, Silchar)

ASSAM UNIVERSITY, SILCHAR

(A Central University)

NOTIFICATION

The under mentioned candidate is declared to has qualified for award of the degree of Doctor of Philosophy (Ph.D) of Assam University for the thesis submitted by his/her on the title noted against his/her name. The award of Degree of Doctor of Philosophy is subject to ratification by the Board of Research Studies and the Executive Council of Assam University.

The Degree will be conferred to him/her at the next convocation of the University. Particulars of the candidate are as follows:-

Sl. No	Name of the candidate	Deptt.	Ph.D. Regn. No & Date`	Title of the thesis	Name of the Supervisor/ Co-supervisor	Date of declaration
1	**Abinash Bharali**	Economics	Ph.D/1009/09 Dt.27.10.2009	"A Study on the Demand for Ecotourism Using Non-Market Valuation Methods : The Case of Kaziranga National Park."	Dr. Ritwik Mazumder, AUS	30.05.13

Registrar i/c

No. AUK-214/5/2008/Vol-1 30.05. 2013

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