# ECONOMIC VALUE OF RECREATIONAL FISHING: A CASE STUDY OF MANGLA DAM, MIRPUR AZAD JAMMU AND KASHMIR

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## CERTIFICATE

This is to certify that this thesis entitled: **Economic Value of Recreational Fishing: A Case Study of Mangla Dam Mirpur Azad Jammu & Kashmir** submitted by Ms. Sidra Ayub is accepted in its present form by the Department of Environmental Economics, Pakistan Institute of Development Economics (PIDE), Islamabad as satisfying the requirements for partial fulfillment of the degree in **Master of Philosophy in Environmental Economics**.

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Dedicated to my beloved mother for her love, endless support, encouragement and sacrifices

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Contents

## Abstract

*The study tends to determine the recreational value of fishing at Mangla Dam Mirpur Azad Jammu and Kashmir. This study is based on primary data collected from 250 visitors. The data was obtained through structured questionnaire. For analysis Individual Travel Cost Method, descriptive statistics, priority indices were used. The objectives of the study are to evaluate recreational value of fishing at Mangla Dam, to assess the problems faced by visitors, and to explore the factor that will affect the recreational demand of fishing at Mangla Dam. Estimating the economic values of the recreational fishing is an important input to decisions about rules to maintain or upgrade the site quality. The result shows that the annual monetary value of recreation is 64.5 million rupees and after provision of more of facilities this value may increase up to 70 million which is a much high amount which yields to economy every year, however in practical scenario it is not actually for the Mangla dam, because of the fact that the total cost is sum of opportunity cost of time spent at travelling, accommodation cost, food, lodging, boat rent etc. which has been paid to other party. The major influencing factors of visitation frequency were observed as Travel Cost, Household Income, Age, Household Size, employment status, retirement, gender, distance etc. The calculations show that visitors placed higher value to the sitting area problem. During survey majority of visitors complain about the issue of sitting area. As there are no proper shades or sitting facilities available at the dam. After providing the desired services, the authority would have sufficient resources for maintenance and up gradation of facilities.*

# Chapter 1

# INTRODUCTION

Fish is one of the valuable products among agricultural goods. It has been reported that in Asia there is fast growth in the employment sector of fisheries (FAO, 1998). Annual sale of this product was around eighty billion dollars and its economic value is increasing every single year (FAO 2006). Fish export is an important source of foreign exchange earnings for many developing countries. This sector not only contributes to total income of countries but also helps to eradication of poverty , providing employment opportunities to locals and migrated (FAO 2006). In Pakistan, fisheries are playing an important economic role as it is providing employment to over four hundred thousand people directly and six hundred thousand people in the secondary industries (Ebrahim 2014).

The fishing for aquatic animals that is not considered as the individual's primary resource to meet the essential physical needs is known as Recreational fishing (Arlinghaus and Cooke 2009). The proposed study explores the recreational value of fishing at Mangla dam Mirpur, Azad Jammu and Kashmir. It is located at latitude and longitude coordinates of 33.15 and 73.65. It is very close to the city of Mirpur, It is constructed on River Jhelum. It is considered as multipurpose reservoir as it is primarily constructed for storage irrigation water, hydroelectric power generation and flood control. Fisheries and recreation has developed as a byproduct. These man made water habitations were conventionally used for water conservation for domestic use, irrigation and fish culture (Petrere 1996). As pressure upon the freshwater resource has been grown up. The population's wealth and leisure time have also increased; they had more of time available for recreation hence demand increased. The ongoing development of the freshwater resource may threaten several other use whose monetary value is not fully revealed in market or the non-

marketed good like swimming, angling, birds watching, rafting, etc. and enhancement of scenic beauty. At present, those who favor keeping freshwater resources found themselves at disadvantage in political debates because they cannot express the value of the resource in economic terms. To help fill this void and to better understand the value of the scarce natural resource, this study aims to estimate the economic value of recreational fishing of Mangla dam**.** As it can be seen through literature that over the time the increasing demand of recreational fishing affects the stock of fish. There is need to sustain it and for this first of all one should know the recreational value of that site. Masher and Rohu are common at Mangla dam. The other types of fish in the reservoir are Mori, Thaila, Masher, Rohu, Mullee, Grass Carp and Silver Carp etc. It is listed among the biggest dams of world (Mirza, Nadeem et al. 2012). The surface area of Mangla Dam is about $265Km^2$ a large size water reservoir that can be approached from many directions for more benefits (Mirza, Nadeem et al. 2012). Some of the recreational sites like Mangla Fort, Ramkort fort, Aasifa Bhutto Park etc. will add up more value for visitors, who are visiting there. Mangla Fort which is located up the cliff on the main dam and also houses a museum of Mangla Dam history. After the construction of Mangla Dam, Mangla Fort actually became a part of the dam infrastructure, which is going to add up to the recreational value. Man-made dams across the major rivers have been in Indian subcontinent for several centuries (Mirza, Nadeem et al. 2012).. It is always a common observation around visiting sites, that people, visiting around always face some problems at every new place. But some problems are common even you visit the site many times. So it is also important to examine these problems around this specific site Mangla Dam which is also the focus of this study.

## 1.1 Research Questions

1. What is the recreational value of freshwater fishing at Mangla Dam?
2. What problems are faced by visitors at site?
3. What factors affect the recreational demand of fishing?

## 1.2 Study objectives

1. This study aims to evaluate recreational value of fishing at Mangla Dam.
1. To assess the problems faced by visitors in the recreational site of Mangla Dam.
2. To explore the factor that will affect the recreational demand of fishing.

## 1.3 Significance of study

Although recreation fishing is not an industry but it is still possible to make valuations using the expenses of the fishermen to get consciousness that how recreational fishing can impacts on any formal economy. The recreational fishing also has economic significance in a way that anglers would be willing to pay more for the services provided by site rather than actual cost of fishing. But in case of Pakistan resource managers are not primarily concerned with the impact on economy rather they should be concerned with any cost to maintain the site in proper shape but usually there is no regular cost to maintain any recreational fishing site, and also access to recreational freshwater fisheries is allowed by a very minor license fee and sometime access to recreational fishery is without any fee, which in fact did not reveal the actual value of recreation fishing. Recreation fishing is one of the activities, where the contentment of consumers' demand depends on diversity of different goods which comes from numerous economic segments The study tends to fulfill this gap by determining the recreational value of fishing, which the anglers has placed on it, and also exploring the causes that can/may affect the demand for recreational angling. The study also contributes in a way that the problems faced by visitors were identified and policy implications

would be given so that these problems could be minimized. The study provides estimates from information which will be collected from on-site survey.

## 1.4 Structure of Study

This study is structured into five chapters. The second chapter provides the literature on valuation studies. Third chapter included data and methodology. Chapter four provides the results and discussions. And last chapter is about conclusion and policy implications.

# Chapter 2

# LITERATURE REVIEW

This chapter is divided into following sections. Section 2.1 presents the review of empirical studies. Section 2.2 presents the conclusion and summary of literature

## 2.1 Review of empirical literature

McConnell (1992), recreational fishing is basically considered as a consumer good, therefore each and every recreationist have a Marshallian demand for fishing at a specific spot. The demand curve shows that at a given time period, when the number of trip increases then how the marginal value of fishing goes down. The demand for recreational angling is high at a point where anglers will keep on making trips until the value of accessing the trip go beyond its cost. Recreational angling has economic significance in a sense that the recreational anglers will be willing to pay more for the services provided by recreational site rather than the actual cost of fishing therefore, for measuring the economic value of recreational fishing consumer surplus is used as a measure of economic value of recreational angling (McConnell and Strand 1994)

Wheeler and Damania (2001) used CVM to evaluate the value of recreational angling in New Zealand. The study obtained data from large scale interview conducted at boat ramps across the country and he conclude that recreational value of fish species depend on motives of targeting a species. The marginal value of fish which has been caught for eating purpose reflects the market price of that species.

Nandagiri (2015) estimated the economic value of water and the average willingness to pay by visitors for the economic benefits provided by Pilikula Lake. The average willingness to

pay by visitors for the recreation is dependent on personal and demographic variables and if the authorities provide extra facilities like swimming, fountain etc. then there can be significant changes in visitation rate.

Numerous studies evaluate the economic value of recreational angling around globe. Some of the empirical literature concludes that fee paid by anglers to access the site is beneficial for the economic point of view. In England the actual market value of fish was evaluated by putting the fisheries characteristics into the function. Jiang (2014) stated that fisheries sale price can be affected by the fisheries attributes like access to fishery, length of trip taken, average catches etc., and hence implicit price function can be estimated. Recreational fishery is generally administered by public body, and it is supposed to be not openly traded in market. The license which have been issued by the public authority have very nominal fee which actually did not show the exact value of recreational fisheries. Therefore, the license fees/price cannot be considered as true indicator for determining the value of recreational fishing.

Shrestha, Seidl et al. (2002) said that recreational angling is considered as an important economic activity in Panatal. It has been expected to compete with commercial and subsistence fishing as employment possibility for native. As high value attach to it will help local people to get maximum profit from looking after their gift of natural amenities.

Recreation fishing is one of the activities, where the contentment of consumers' demand depends on diversity of different goods which comes from numerous economic segments. So it can be considered as composite product. Therefore to determine the economic influence of recreational fisheries a demand side is used (Roth and Jensen 2003).

Non-market valuation approach is necessary to value the services provided by the natural environment so to make natural resource management decision more appropriate and accurate.

The shortage of a financial approximation of a natural resource sometime reveals that resources have zero value (Boyer and Polasky 2004).

Rosenberger and Loomis (2001) provides an analysis of nonmarket evaluation literature between 1967 and 1998 which focus on estimating economic use value of recreational activities. They analyses that benefits transfer should be pragmatic in a sense that when they are supposed to measure, then tradeoff are necessary in choosing the best alternative. They conclude that a rough estimate of dollar value of recreation in economic analysis is better than implying zero value to recreational activities by leaving them out of model. The price variable, site characteristics and socioeconomic factors remained in use to measure use value of recreational angling.

Economists have developed different approaches in order to value the non-marketed goods. Two major categories of non-marketed evaluation techniques re revealed preference approach and stated preference approach. The former method supposed that the consumer choices can be shown indirectly by their resource utilization behaviors

In Travel Cost Method (TCM) the most usually used revealed preference approach is to value the natural resource services which are associated with recreational activities. In stated preference method the consumers were asked certain set of hypothetical scenario to get the details about how greatly the consumer values the non-marketed services and good. The hypothetical scenario can precede a series of selections that each choice contains a trade-off in its selection. Contingent Valuation Method (CVM) can also be used in valuation of non-marketed goods and services. Both methods have certain advantages and disadvantages associated with them. As far as revealed preferences are concerned it only provides estimates for use value, since it is not revealed by any type of behavior of respondents.

The Strength of revealed preference method is that the estimations are actually based on marketplace performance; the individuals have devoted actual time and spend money to take visits to the site of recreation. The other stated preference technique may give approximations of non-use value. In this approach the actual behavior of consumer is not actually observable (Cumming et al. 1986).

Reveal preference method also assumes that recreationists are making optimum varieties in their behaviors. But in real scenario the recreationalists often lack perfect information while making recreational choices and making those choices which are not optimal. When recreationists are making the sub optimal choices then biasness will be created in their recreational choice behaviors (Anderson and Bishop 1986).

Hotelling (1947) developed the travel cost method (TCM). It is usually used to value non-market goods which are mostly based on revealed preference approach. In 1940s he used this methodology to estimate the value of national park of United States, by considering the visitation pattern of tourists. The foundation of this method is that the cost incurred by visitor for a specific trip can be used as a proxy for recreational value placed by visitor. This is the minimum demand price by the visitors. He hypothesized that the cost of travelling incurred by visitors to the site of recreation represents the price of that recreational visit made by visitors.

Therefore demand for recreational site can be estimated. The recreational demand of site can be affected by other factors as well such as household income, status of employment etc. these factors may affect the opportunity cost of the time which has been spent on travelling (Clawson and Knetsch 2013). Moreover the recreationist perhaps will differ in the way they price the time consumed on travel; might be this is considered as price to someone or advantageous to others subject to the consumer's choices. In the valuation of non-marketed good the major assumptions

of TCM is total price of visiting a particular recreational site reveals its recreational value (Turner et al. 1994). According to law of demand, price and quantity demanded have negative relationship, similarly when travel cost increases, the visitation rate to the site decreases.

An empirical estimation of this demand is crucial for determining the value of recreational services provided by the site. So to calculate the recreational demand function, the information on varying travel cost and other socioeconomic explanatory variables are used. TCM can also be applied to estimate the recreational value of hunting, fishing, and climbing at recreational sites. The sites may be park for wildlife viewing, trail for hiking, river or lake for fishing or the area where recreational activities can takes place.

In literature the travel cost method employs a survey of cross sectional anglers that might go for fishing on the site which is of their interest to have the visit rate or frequency of visits to the site, by doing so the travel cost of a visit can be estimated, hence the average demand of recreational site would be estimated. This demand function can be used to estimate the consumer surplus through all recreationists from angling at the spot. By generalizing the experts can get a estimate of the total consumer surplus of all anglers, which is the net economic value of fishing or consumer surplus at the site.

About twenty percent valuation studies used single site approach to evaluate the value of non-marketed recreational resources (Ingraham and Foster 2008). The travel cost approach is actually based on theory of consumer surplus, that's why it is commonly accepted. The travel cost approach used actual data from market deals and had the capability to show individual preference and selections accurately (Haab and McConnell 2002).

Whitehead (1991) measures the actual benefits of upgraded quality at a single recreational site. The study employs the exogenous measures of recreational quality instead of

the usual endogenous measures. The study shows that there is inverse relationship between travel cost, travel time and number of fishing trips. As increases in cost and time will decrease the number of fishing trips. However it will go up with increases in recreation quality. The variation in recreation quality at the single-site is explored by Catch rate regression model. Changes in consumer surplus due to change of quality are measured by using the individual variation in quality and estimates of recreational benefits. If water quality managers can establish the link between water qualities and catch rates, this type of procedure can be used to control how much water quality improvement should be followed.

Shrestha, Seidl et al. (2002) determine the indirect market use value of angling of Brazilian Pantanal. The use value is estimated in terms of consumer surplus or angler's willingness to pay. The study used a single site travel cost approach, assuming the entire study area as a single fishery. On site interviews was conducted. In their demand function, frequency of trips is taken as dependent variable and the independent variable is price of a trip. Respondents were questioned how much they spent total travel time and cost of travelling in their trip from and to the site. The study employs one quarter of wage fraction as opportunity cost of time. Different demographic variables like income and education were also collected. The seasonal trip frequency taken as count data truncated at single. So the study used truncated Poisson approach and non-linear least square regression model. The former approach produced a consumer surplus guess estimate of US$541 each tour, and the non-linear square approach produce guess estimate consumer surplus of US$870 per trip.

Kelch, Lichtkoppler et al. (2006) evaluate the value of steelhead fishing of Lake Erie by using single site travel cost method. For steelhead angling information on site survey was conducted, and the respondents were also asked to contribute in a mail survey. The study focuses

on single day trip for estimations. The study takes round trip opportunity cost of travelling and vehicle cost as the total cost of a trip. Thirty percent wage fraction is used as opportunity cost of time (Cesario 1976) . The study produces an estimate of total economic value of US$26 consumer surplus of each trip.

Fleming and Cook (2008) said that it is very valuable to consider the cost and benefits of each optimal choices so to measure the comparative advantages of substitute management tactics. The cost of evaluating the recreationist should be estimated beside the anticipated profits of imposing boundaries on tourist access. The policy plan to lessen tourist access could be defended, if the cost of accessing the benefits out weights its cost then

(Rolfe and Prayaga 2007) estimates the recreational value of fishing at fresh water dam in Queensland by employing travel cost and contingent valuation methods. The study divides the visitors to those who are frequent visitors and occasional anglers. The study shows that recreational value varies between two groups of anglers and also across sites the survey was conducted by randomly intercepting anglers at boat ramps. The study estimated two separate models of having different definitions and different variables of travel cost. In first model travel cost is taken as full car costs that include cost of fuel, cost of maintenance and insurance, in second model the researcher applied the perceived costs because this costs were utmost probable to signify the opportunity costs of time while making tour decision. Bateman (1993) used truncated binomial regression model and estimate the total economic value of anglers consumer surplus of AUD$5.53 million.

Anglers made trip which may be for single and multiple purpose. In former trip anglers were involved only in one activity. His/her sole purpose of trip was fishing for which he/she left their home, and after fulfilling their demands returned to home. This type of trip perfectly fit the

travel cost method, as far as multipurpose trip concerned, anglers engaged in multiple activities like he/she may visited friends, they may go for shopping and many more. The tour which have been taken for multipurpose was generally more technical, as expenditure of trip and cost of time here did not actually relate with fishing alone (Parsons and Wilson 1997).

Spread of trip cost among the multipurpose task created problem and also there is no sense in recognizing the marginal cost for recreational portion of trip unless certain assumption are made on it. Therefore behind TCM the major assumption was sole purpose trip. The statement is supported in the study of (Freeman 1992). He said that there must be sole purpose of trip. If the trip was multipurpose then the total cost cannot be properly distributed among all multi pattern trips. Smith and Kopp (1980) concluded that the sole purpose of recreational trip should be the use of that site only. Haspel and Johnson (1982) said that cost of travelling should incurred that cost only which was used to get access to the recreational site.

## 2.2 Summary and Contribution of this study

By reviewing the literature on recreational value of natural resources it is clear that recreational value has economic significance. By putting value to our recreational resources we can make it sustainable. The above mentioned literature clearly demonstrates that recreational fishing also has economic importance like commercial fishing. The recreational sector of fishing is providing employment opportunities in other sector as well (food, lodging, other goods and services sector). The recreational fishing also has economic significance in a way that anglers would be willing to pay more for the services provided by site rather than actual cost of fishing. But in case of Pakistan resource managers are not primarily concerned with the impact on economy rather they should be concerned with any cost to maintain the site in proper shape but usually there is no regular cost to maintain any recreational fishing site, and also access to recreational freshwater fisheries is

allowed by a very minor license fee and sometime access to recreational fishery is without any fee, which in fact did not reveal the actual value of recreation fishing. So the study tends to determine the value of fish for recreational anglers so that the recreational sector cannot be ignored during management strategy. This is the reason that this study focuses on the recreational value of the fishing at Mangla Dam which has not been done earlier.

# Chapter 3

# DATA AND METHODOLOGY

This chapter breaks into different sections. Section 3.1 relates to the theoretical framework of study. Section 3.2 describes the data type, data sources and sample size. Section 3.3 shows the econometric model used in the study. Section 3.4 presents the description and specification of variables used in the study. Section 3.5 presents the construction of priority index and section 3.6 presents the elasticity of bidding for additional entry fee.

## 3.1 Theoretical framework

For valuation of recreational sites TCM used. TCM is actually the extension of Household production function approach. The basic assumption of household production function is the household utility function depends on decision about their consumption and production pattern. The travel cost method evaluates the individual preferences for the demand of non-marketable goods. The foundation of this method is that the cost incurred by visitor for a specific trip can be used as a proxy for recreational value placed by visitor. This is the minimum demand price by the visitors. According to law of demand, price and quantity demanded have negative relationship, similarly when travel cost increases, the visitation rate to the site decreases (Siddiqui, 2003).

Travel cost methods have further two extensions, one is named as zonal travel cost method and other one is the individual travel cost method. The individual travel cost method take into consideration the inherent variation in data set. Further by using small number of observation the trip generation demand function can easily be estimated. But as far as zonal travel cost is concern. It requires more information about visitor's characteristics, their preferences and behavior.

Therefore for simplicity the study employed individual travel cost method (Garrod and Willis, 1999).

The study uses the concept of Nilleson (2002), a consumer is said to be representative consumer if he consumes marketed good and also environmental good (visit to recreational site). Initially the study assumes that visitors maximize their utility subject to budget constraint. The budget constrain is actually income earned by visitor. The algebraic expression of utility maximization is: Max: U (a, b)

Subject to: Hourly wage rate*hour of labor = price of marketable good + price of environmental good

The study further assumes that visitors maximize utility subject to not only budget constrain but also to time constraint, as there is opportunity cost of time. The total time available to anglers is as follow:

Total time = hours of labor wage+ round trip time on travelling + time spent on site.

By substituting time cost into budget constraint, will yield the demand function of visitors:

number of visit = f (price of trip + substitute price +income +socioeconomic variables)

After the estimation of demand function the next task of the study is to draw the demand curve. It can be derived by varying the total round trip cost of accessing the site by keeping substitute site's price, household income constant. The major objective of travel cost analysis is to estimate the consumer surplus, which will provide an insight that why anglers are valuing the site. By deriving the demand curve the consumer surplus can easily be calculated. Consumer surplus is actually the area above the estimated price but below the demand curve. It actually depicts the amount which an angler is willing to pay for recreational site.

## 3.2 Data type, data sources and sample size

The study area is Mangla dam Mirpur. Primary data is used in the study which is collected through questionnaire. It consists of different sections. First section includes general information of respondents like his/her name, locality, age, gender, income and year of schooling. The other section contains information regarding their primary residence, then they will be asked about trip frequency to that site, their other trip related travelling expenditure, accommodation cost etc. Number of trips to the site per period of time by ith visitor is taken as dependent variable. Price of trip and other demographic variables is taken as independent variables which affects the recreational.

Initially the P\pilot test was conducted before the main survey to check the suitability of designed questions. The targeted population in the main survey is Mangla dam visitors. The study employs primary data collected through structured questionnaire. According to the officials of organization of Mangla dam about 115,000 people visit Mangla dam annually from all over the Pakistan. The average number of visitors was about 300 on weekdays and weekends respectively. Average per month number of visitors was about 14,400, so this study uses a sample size 250 (1% of the population) for three months field survey i.e. March-May 2018. This sample size is enough and appropriate to use because for such type studies Ahmed (2009), Iamtrakul *et al.* (2005), McKean and Taylor (2000) used sample sizes ranging from 200-250.

## 3.3 Econometric model

The dependent variable (DV) of the study is number of trips demanded annually, which is count variables, i.e. each count of trip is at least one. If angler did not go to fishing, then automatically that angling/trip day will not be included in data.

In literature other studies (Pargaya et al. 2012) also used truncated negative binomial regression model to estimate their findings. Keer (2004) in their study concludes that total numbers of visit to the site by anglers are positive integers. Other models which are having continuous dependent variable may take into consideration the truncation inherent in data set, but these models can not consider the integer choice of anglers. So this issue is resolved by poison and TNB in the valuation studies, therefore the proposed study also used truncated negative binomial count regression analysis. The proposed model of the study is:

$$(v_i) = \beta_0 + \beta_1(Ttrip) + \beta_2(Age) + \beta_3(HHS) + \beta_4(HHI) + \beta_5(Dis) + \beta_6 D_1(male) + \beta_7 D_2(retired) + \beta_8 D_3(employed) + \beta_9 D_4(improved\ services) + \varepsilon$$

$v_i$= Number of trips demanded annually by ith individuals

$Ttrip$ = total cost of trip, this cost includes the time cost, transport cost and other related cost in Pakistani Rs

$AGE$ = age of visitors in numbers

$HHS$ = household size in numbers

$HHI$ = household income in Rs

$DIST$= distance from destination to the site in Km

$dRETIRED$ = dummy variable; if retired =1, 0 otherwise

$dEMP$= dummy variable; if employed = 1, 0 otherwise

$dSEX$ = gender of visitors, dummy variable 1= male, 0= otherwise

$dQOS$ = perception of quality of services provided by management 1= satisfied, 0=otherwise

$\varepsilon$= error term

## 3.4 Specification of variable

### i) Trip frequency or Number of fishing trip

Number of trips demanded by ith visitors annually is considered as dependent variable. The reported number of trips is used by the study during analysis.

### ii) Price of trip/visits

The respondents were asked certain set of question which represents their cost of trip. The respondents were asked only about their certain trip because it might be difficult for anglers to memorize all the trips which they had taken during the whole seasons (Parsons 2003). The study was inquired about respondent's current trip in order to estimate their trip cost.

### a) Total cost of trip:

The total trip cost is divided into transport cost, the opportunity cost of time, and cost of accessing the site.

### b) Transport cost:

Transportation expenditures incorporates the round trip expenditures of anglers i.e. the expenditure made by anglers travelling from their homes to the locality where fishing can be happen the trip expenditure may include the fair of car, bus, aero plane etc. other expenditure made throughout the trip such as cost of accommodation, cost of fuel for boat, fee paid to guider etc. (Bateman 1993). The study also uses this criterion to incorporate the transport related cost.

### c) Time cost:

Time has a value attached to it. When an angler made trip he will have to bear time cost. The opportunity cost of time has great importance in valuation studies. The time which have been spent for travelling to and from the recreational site can be dedicated to other economic activity. In

literature some of the studies used one third fraction of wage. One third proportion of wage is considered as lower bound and full wage was taken as upper bound in recreational literature (Feather and Shaw 1999).

In recreational studies, the opportunity cost of time is taken as fraction of anglers wage rate. There exists tradeoff between time spent in work which pays off and time spent on leisure activities. Considering this assumption the angler will increase the time spent on working unless the marginal value of working hour wage will equalize the value of time spent on leisure activities. The tradeoff relationship does not exist for unemployed, retired and student anglers. In spite of having this difficulty still the wage based method is in practice to value the time which has been spent on trip (Parsons 2003).

The time spent on recreational site is assumed to be endogenous as every single angler determines the time according to his/her choice. Anglers who spent more time on fishing will place high value to his/her fishing experience, as we know that time has opportunity cost so it can be said that time can be spent on recreational site has utility as well as cost. By having dual nature of on-site time, it has been assumed that time spent on recreation site has net zero opportunity cost, so the study will also consider as proposed by selected literature (Whitehead 1991, Kerr 1996, Rolfe and Prayaga 2007). So the study only calculated opportunity cost of time full wage per hour which has been spent on travelling to the site (keer and Geer,2004)

**d) Fishing expenditures:**

Some of other fishing related expenses are expenses of local accommodation during trip, fee of guide services, cost of fuel for boats etc. these are the direct cost to fishing. Other durable equipment's which can be used for fishing like reels, roads, etc. generally not included in the valuation literature because it might be complicated to determine and also it is assumed to be a

very small part of trip cost when the full cost of these instruments is remunerated to the life of instruments (Parsons 2003). In the study the fishing expenditure incorporates the permit fee, boat fee and other fishing related expenditures.

**iii) Demographic variables:**

The demographic variables like age, gender, education status, employment, income of individuals as well as household etc. can/may affect the demand of recreational fisheries are as following

**a) Gender**

Gender is used as dummy variable in the study; if the gender is male it will take value of 1, and otherwise 0. It has been found in previous empirical studies that ratio of involvement of men in recreational activities is significantly greater as compared to women (Schroeder, Fulton et al. 2006).

**a) Age**

The element of age has important contribution in determining the demand of recreational fishing. So the study incorporates this variable in term of reported age in numbers.

It may increase or decrease the demand for fishing trips. After retirement the anglers opportunity cost of time will substantially decrease, there will be more of time available to them for recreational activities, so they will likely to take more trips hence increasing the trips demand. On other side by more age means less active the anglers will be ,hence the demand for fishing trips go down (Ojumu, Hite et al. 2009).

**b) Composition and size of family**

Family size and composition considered as another determinant. Reported household size is used in the study for analysis. The Anglers will be questioned about their size of household, the number of children in their family, and number of persons in the family who are fond of fishing. There

will be negative relationship between household size and recreational fishing. The larger the family size means the less of time available for recreation eventually fewer trips will occurs holding all other things constant and vice versa (Jiang 2015)

**c) Income of household:**

Income of household is actually related to that part of consumer income which will be offered for recreational spending like eco-tourism, angling, fishing etc. Household income is taken as continuous variable and the study used the reported income by visitors. There may be direct relationship between the household income, and the fishing trips. Anglers having more household income will eventually take more trips, keeping all other factors constant (Wheeler and Damania 2001)

**d) Status of employment**

Status of employment will be an important indicator for the availability of leisure time for consumers. If the angler is employed the variable takes he value 1 and zero otherwise. The anglers will be likely to make more trips to fishing who are unemployed or not having full time employment during the fishing season

**e) Price of substitute site**

The inclusion of price of alternate site or alternate activity is important in the analysis of travel cost. If it is not included in the analysis then there will be chances of biasness in the regression analysis of welfare estimates. This variable is very important and significantly accepted in the literature, but the issue is either to take alternate activity or site as a substitute (Bowker et al. 1996). The study include this variable as categorical variable where anglers were given option to choose activity, if the anglers choose to stay at home or choose other activity then price of substitute is given zero.

**Table 3.1 Description and Construction of Variables**

| Variables | Description of Variables | Construction of Variables |
|---|---|---|
| V | Number of trips (annual) | Reported trip count |
| Gender | Gender | Dummy variable: 1= male, 0= otherwise |
| Age | Age of recreational anglers | Reported age |
| HHI | Household income | Reported income in Pakistani RS |
| HHS | Household size | Reported size |
| D_Emp | Employment status | Dummy variable<br>1= employed : 0= otherwise |
| D_RETIRED | Retirement | 1= retired: 0=otherwise |
| T_trip | Total cost of trip | Time cost+ travel cost+ + fishing expenditures +miscellaneous |
| TC | Time cost | Dailywage rate=monthly income/30<br>Hourly wage = daily wage/8 |
| TTC | Traveltime cost | (Hourly wage rate)*(time taken to reach the site) |
| Round trip cost | Round trip cost | Travel time cost*2 |
| EXPFISH | Expenditure on fishing | License fee + boat fee + other fishing related cost |
| SUBPRICE | Price of Substitute cite for fishing | Total expenses in Pakistani RS |
| DIST | Total round trip distance | Reported distance in Km |
| EDU | Education of visitors | Years of schooling |

## 3.5 Construction of priority index

To assess the problems faces by visitors at recreational site of Mangla Dam the study used the priority index. The major problems faced by recreationist was listed and then these problems was

prioritized according to the recreationists (Ahmed and Hussain 2016). The index is calculated by using the formula as follow:

$$I = \in S_I F_I / N$$

I = Priority index, the value of index lies between 0 and 1

N= total number of observation

Si= scale value of ith priority

Fi = frequency of responses of ith priority

The major problems which was faced by visitors at Mangla dam was listed during the pilot survey. After that when the final survey took place the respondents were asked to prioritize the issue which they value the most. The problems faced by visitors at site are availability of washrooms, parking area, sitting area, rent of boats, hoteling, and environmental cleanliness. In the survey people were asked to give priority to these listed problems so that these problems can be minimized by giving proper policy implications.

## 3.6 Elasticity of bids for additional entry fee

In this section for suggesting, a feasible additional entry fee for the Mangla dam for the revenue generation activities and for the maintenance of the dam and for further conservation of the aquatic life, the study used the recreational demand elasticity for recreational visits. Suggesting a feasible entry fee is not so easy because we have to consider the number of visits that must not decline. For suggesting the entry fee the study used the recreational demand elasticity for different bids that were given to the visitors for the entry fee.

$$\boldsymbol{\eta}_i = \frac{\Delta Q}{Q} * \frac{P}{\Delta P}$$

By Elasticity of demand it means percentage change in quantity demanded due to the percentage change in the prices. The elasticity of demand of recreational visits is as follow.

$$\boldsymbol{\eta_i = \frac{\Delta N}{N} * \frac{\Delta C}{C}}$$

Where N is the number of visits per year,

ΔN= $N2 - N1$ $N_1$ are the current number of visits and $N_2$ is the number of visits after the improvements. And C is the total cost of the visit,

ΔC= $C2 - C1$

$C_1$ is the current cost of the visit and $C_2 = C_1 + entry\ fee$

Bid for Entry fee was 80, 100, 120, 60, 40

# Chapter 4

## RESULTS AND DISCUSSIONS

This chapter deals with data analysis in which we use negative binomial regression technique. This chapter breaks into different section. Section 4.1 presents the descriptive statistics of variables. Section 4.2 presents the regression results. Section 4.3 presents the results of price elasticity for

entry fee, section 4.4 presents the Consumer Surplus and Recreational value of fishing at Mangla dam. In section 4.5 the study discusses the Results of priority index.

## 4.1 Descriptive statistics

**Table 4.1 descriptive statistics**

| **Indicators** | | **Statistics** |
|---|---|---|
| Mean household size (HHZ) | | 4 |
| Mean household income (HHI) | | Rs.36500 |
| Mean age( years) | | 32 |
| Average cost of per visits | | Rs. 18560 |
| Education of respondents | Matriculation/ intermediate | 40% |
| | Bachelors | 34% |
| | Master or above | 14% |
| Gender | Male | 66% |
| | Female | 34% |
| Employment status | Employed | 59% |
| | Not employed | 41% |
| Purpose of trip | Recreational fishing | 52% |
| | Boating | 25% |

Source: Field survey

| | | |
|---|---|---|
| | Others | 23% |
| Mode of transport | Private car | 59% |
| | Tour bus/ mini bus | 12% |
| | Other modes | 29% |

**a) Demographic characteristics of respondents**:

On average the 66% of sample respondents are male and 34% are female respondents. Higher percentage of male respondents may be due to fact that male are more keen to involve in recreational activities like birds watching, hiking, fishing, visiting heritage sites. 63% of respondents are married and mean age of visitors is 32 years. On average 59% visitors are employed. On average mean income of visitors is 36500 rupee

As far as education is concern the sample respondent's shows that on average 40% respondents are having intermediate education, 34% are having bachelors and 14% visitors are having master or above. The sample statistics are showing that education is not a true determinant of number of visits in our study. Majority of visitors are coming from faraway places just for leisure there is no any involvement of education. This means that education element is insignificant in our study.

On average mean household size is 4-5, this is consistent with the empirical literature i.e. more of size of household , less will be number of trips. Individuals having household size more than are having less involvement in recreational tours in our case. 61% of respondents are retired and rest is not retired. This means ration of involvement of retired persons in recreational activities are more as compared to those who are not retired yet. Also retired people are usually having low opportunity cost of time, therefore they could engage more in recreational activities.

On average number of visits during a year are 4 visits. On average cost of per visit is 18560. Respondents were also asked about the purpose of their visits, on average 52% of the visitor's claims that their purpose of trip is recreational fishing, 25% respondents were there for enjoying boating and other activities. On average visitors stay there for 3-4 hours per trip.

When visitors were asked about their mode of transport to the site then the results shows that on average 59% of visitors used their own car, 12% came by tour bus and rest of visitors used different mode of vehicles to reach to site like taxi, motorbike etc. Respondent were also asked about their trip detail like if they visits any other site for recreational fishing out of 250 respondent only 12% of visitors go to alternate site, the reason is as this site is having historical value and there is no best substitute available for this site. About 87% of respondent claims that they are not having substitute of this site, they only come for fishing at this dam specifically. As far as quality of services provided by site is concern out of 250 respondents 30% of them said that quality of services by site is fair, 20% mark the quality as good, and 15% marked as poor quality of site. When they were asked about the management services 40% of them are satisfied with the services provided by management of Mangla dam, rest were not satisfied. 72% of them want improvement of site. Then they were asked for the better provision of services what type of payment method could be used, 50% of respondent said that government should allocate more of budget to theses historical sites, 40% of respondent agree that increment in entry fee could be option for the financing the dam management , rest or respondent marked donation as mode of finance.

**b) Respondent's willingness to pay additional entry fee**

The respondents were asked hypothetical questions about their willingness to pay high entry fee. On average 69% visitors are willing for increment in entry fee. Visitors were given different bids.

When they were asked to pay 80 rupee as entry fee, 58% respondent show their willingness to pay this amount, on bid of 100 rupee 50% respondents are willing to pay , on bid of 120 Rs. 82% visitors are showing their willingness to pay, on 60 rupee as entry fee on average 72% are willing to pay this fee. For the bid of Rs. 40, on average 77% respondents are willing to pay for improved recreational facilities.

Then they were asked after improvements of recreational services in the near future, perhaps you may wish to come to the Mangla dam and may want to spend more time for fishing. How many more times would you then be there, the statistics show that on average number of visits increased up to 6 visits per visitors annually.

## 4.2 Regression resultss

Results of negative binomial regression model is shown in table 4.1, the dependent variable used in the study is the number visits from the last 12 months to the Mangla dam for recreational fishing and explanatory variables of the study are Age, Total cost of the Visit which is actually travel cost (TC), Household size (HHS), income (INC) and distance (Dis). The dummy variables used in the study are Gender (G) and visitor perception about the quality of park (QOS), status of employment (d_Emp), retirement (d_retirement)

**Table 4.2: regression results of factor affecting the number of visits. Dependent variable is number of visits**

| **Independent variables** | **Coefficient values** |
|---|---|
| Intercept | 1.7833<br>(0.04) |
| Age | -0.0001<br>(0.0003)* |
| Distance | -0.0028 |

| | |
|---|---|
| | (0.00031)** |
| Household size | -0.0098<br>(0.0032)** |
| Income | 0.0001<br>(0.00008)** |
| Travel cost | -0.0005<br>(0.00006)** |
| Dummy 1 (1 for male) | 0.0600<br>(0.012)*** |
| Dummy 2 ( 1 for retired) | 0.0381<br>(0.010)*** |
| Dummy 3 (1 for employed) | -0.0294<br>(0.0069)*** |
| Dummy 4 ( 1 for improved recreational services) | 0.0008<br>(0.006)** |

Note: *, **, *** indicates at 10%, 5% and 1 % significance level respectively

The regression results of table 4.1 shows that all the variables used in the model is having expected sign and significance according to economic theories and other related empirical studies on recreation. In model, the variable total cost is actually the travel cost which is showing negative sign and it is significant at 5%, the negative sign indicates that on average the number of trips goes down as travel cost increased. People will take few trips to Mangla Dam. This is the main finding of the recreational demand function i.e. the demand curve of recreation is downward sloping as the travel cost increased. On average anglers will take less number of trips. The variable household size is showing negative sign, which means there is negative relationship between household size and demand of recreational trips. The larger the family size means the less time available for recreation purpose, consequently fewer trips occur to the sit and vice versa (Jiang 2015).The coefficient of household income is positive, means that individual having more income will tend

to make more trips. There exists a direct relationship between the household income, and the fishing trips. The results are consistent with the study of (Wheeler and Damania 2001) Anglers having more household income will eventually take more trips, keeping all other factors constant )

The dummy variable gender is showing positive sign and it is statistically significant coefficient. It has been found in previous empirical studies that ratio of involvement of men in recreational activities is significantly greater as compared to women (Schroeder, Fulton et al. 2006). The dummy variable of perception of quality of services by site is showing positive sign and it is statistically significant it means that if visitors are satisfied with quality of services provided by site they will tend to make more recreational trips.

The element of age has important contribution in determining the demand of recreational fishing. It may increase or decrease the demand for fishing trips. In our case the result shows that the age is statistically significant at 5% and positive sign shows that individual who are older takes more recreational trips because they less opportunity cost of time.

Retired person also tend to make more trips, the results are consistent with previous literature. The literature shows that after retirement the anglers opportunity cost of time will substantially decrease, there will be more of time available to them for recreational activities, so they will likely to take more trips hence increasing the trips demand (Ojumu, Hite et al. 2009).

## 4.3 Results of bids for additional entry fee

Bids were given to the respondents so that feasible entry fee could be suggested as an additional entry fee. Different bids were used in the study. At present the entry fee of the Mangla Dam is 30 RS. Per person. The bidding game clearly shows that visitors are willing to pay higher entry fee,

because they need more facilities and conservation of this resource. The results of elasticity of demand of visits is shown in table 4.**3**

**Table 4.3: Results of bidding**

| Sr.no | Bids for increased entry fee | Elasticity |
|---|---|---|
| 1 | 80 | 0.002224 |
| 2 | 100 | 0.00278 |
| 3 | 120 | 0.003336 |
| 4 | 60 | 0.001668 |
| 5 | 40 | 0.001112 |

**Source: author calculations**

Table 4.3 reveals that for entry fee Rs.120 demand is more responsive towards change in price, i.e. with 1 percent increase in price (cost of trip), the demand will decrease by 0.003%. For the bid of 100 Rs. the elasticity of demand is 0.0027%, which means by increasing price of entry fee, the demand will also decrease by 0.0027 %. For entry fee 40, with 1 percent increase in prices, the demand will decrease by 0.001 %. This is the most feasible entry fee because by imposing this fee number of visits not decline.

## 4.4 Consumer Surplus and Recreational value of fishing at Mangla dam

Himayatullah (2004) consumer surplus is based on estimated recreation demand function for recreational site. The descriptive statistics shows that for an average visitor who visits the dam 4 times a year, with average travel cost of Rs.18560 per trip. Current average consumer surplus is calculated by taking the average willingness to pay for the site. The per visitor consumer surplus is multiplied by estimated visitors per year to obtain total consumer surplus. After imposition of

entry fee the consumer surplus is obtained by adding the feasible entry fee to the actual cost of recreation. After than that the calculated consumer surplus per visitor is multiplied by per year visitors to get the consumer surplus for site. Consumer surplus in simple economic term is the difference of what consumer is willing to pay and what actually he pays. The total recreational value is the sum of consumer surplus and the travel cost of the trip (Himayatullah, 2004).

**Table 4.4 consumer surplus and recreational value**

| | **Consumer Surplus** | | **Recreational Value** | |
|---|---|---|---|---|
| | **Current** | **After the improvement** | **Current** | **After improvement** |
| **Average per visitor (Rs.)** | 19116 | 36784 | 37704 | 55372.76 |
| **Total Annual (Millions)** | 80,669,520 | 155,228,480 | 159,110,880 | 233,673,047 |

Table 4.4 shows Consumer Surplus and total Recreational Value of the recreational fishing of Mangla dam for the year 2018. According to this study the annual monetary value of the recreation is Rs. 80.5 million. This is the value that the dam yields every year for the economy. However, this is not the revenue of the dam. This value is divided into the consumer surplus of visitors and total travel cost of the visitors to visit the dam. Total annual consumer surplus is calculated by multiplying the per visitor consumer surplus with the estimated annual number of visitors i.e. 4220 visitors per year. The total consumer surplus of RS 80 million is calculated and after provision of more of facilities this value may increase up to many folds which is a much high amount which yields to economy every year, however in practical scenario it is not actually for the Mangla dam, because of the fact that the total cost is sum of opportunity cost of time spent at travelling, accommodation cost, food, lodging, boat rent etc. which has been paid to other party.

The consumer surplus shows the additional cost that anglers are willing to pay for improved recreational services.

## 4.5 Result of priority index

The problems faced by visitors at site are availability of washrooms, parking area, availability of sitting area, rent of boats, hoteling, and environmental cleanliness. In the survey people were asked to give priority to these listed problems so that these problems can be minimized by giving proper policy implications.

**Table: 4.5 priority index for problems faced by visitors**

| priority | Components | Priority index | Ranking |
|---|---|---|---|
| 1 | Cleanliness | 0.65 | 3 |
| 2 | Parking facility | 0.63 | 4 |
| 3 | Washrooms | 0.49 | 6 |
| 4 | Sitting Area | 0.79 | 1 |
| 5 | Rent of boats | 0.72 | 2 |
| 0 | Hotels | 0.62 | 5 |

Source: Author calculations

The calculations show that visitors placed higher value to the sitting area problem. During survey majority of visitors complain about the issue of sitting area. As there are no proper shades or sitting facilities available at the dam. Visitors who come from faraway places mostly complain this issue. So according to statistics the priority index value is 0.79, and they ranked sitting area as their first most priority. The second priority is given to the rents of boats, the index value is 0.72 which means that after the sitting problem the second priority is given to rents, the boating club at Mangla dam charging different prices for different boats, the visitors said that rent should be feasible, and

they should fix the rent and they must display it so that visitors get to know the rent of boat before boating. These problems are highly prioritized during the survey. Rest of components is least desire. The demand of recreational visits will goes up, if all of these problems are minimized.

# Chapter 5

# CONCLUSION AND RECOMMENDATIONS

This chapter highlights the conclusion of the study. The section describes the key findings of study and in the next section, the study will discuss about limitation of study and then finally the conclusion of study.

## 5.1 Key findings

The foremost objective of the study is to estimate demand of recreational fishing at Mangla dam. The study employed the individual travel cost method for the estimation of net economic value of recreational fishing. The study used random sampling technique to collect information about number of visits, about their travel cost and other demographic characteristics which may affect the recreational demand of visit. The study used truncated negative binomial model to estimate the consumer surplus of recreational angling.

The consumer surplus of recreational fishing shows the actual economic value of recreational fishing at site. The study also explored the factor which may affect the demand of recreations. The opportunity cost of time is an important determinant of demand of recreations. Other than that gender, distance, substitute price, quality of site etc. also affects the frequency of trips.

The study also focused on problem faced by visitors during their trip. The major problem faced by visitors is sitting area. Majority of visitors complain about this problem. The priority index value of 0.79 shows that visitors placed higher concern on this issue, they want

improvement/ solution of these problems. The visitors are also willing to pay additional entry fee in order to have improved services and quality of site, resultantly number of trips increases.

## 5.2 Limitations of study

The section highlights some of limitation of study.

1. The major problem faced during the survey was information about the number of trips taken by visitors solely for recreational fishing.
2. The variable price of substitute is excluded from the model, because result of price of substitute is not consistent with economic theory. The variable should be positive and significant values, i.e. if the price of substitute is high then respondent may take less number of trips, keeping all other factor constant. The reason for the exclusion of this variable is, during survey the study finds that for majority of respondents there is no perfect substitute of this site, they are coming solely for the trip to Mangla dam. As true substitute of the site is not specified during the study, resultantly respondents are not able to provide the accurate information, some of respondent mentioned the price of different substitute site or some of them mentioned the price of alternate activity. The study is not able to specify the substitute site or activity, so it is important to include true substitute site so to get significant and consistent results (Rosenthat 1987).
3. Measuring the opportunity cost of time was difficult. Because the time spent on travelling could have been used in different ways. For some people travelling is enjoyment, and for others it is a cost. And also time spent on site also has dual nature i.e. cost as well as utility. By having dual nature of cost as well as benefit, the net effect is assumed to be zero. And also there is no standard way to calculate the appropriate opportunity cost of time. In literature opportunity

cost of time is taken as fraction of wage rate; however some studies also incorporate the opportunity cost of time as zero.

## 5.3 Contribution of study

The study contributes in a way that before this, there is no study done on recreational valuation of fishing of Mangla dam. The study also provides the estimate from information which was collected from onsite survey. Problems faced by visitors is also highlighted , and possible policy implications is given to solve these problems, so that improvement can be brought to the site and more of revenue can be generated, which may be used for conservation and management of precious resource. If consumer surplus is high then there will be more chances that entry fee will be increased and vice versa

## 5.4 Recommendations

This section highlights the possible policy implication for the study.

1) The foremost problem of visitors is non- availability of sitting area or shady places. When asked from management authority they claim that during winter the water level is low but during monsoon season the water level go beyond the premises, due to this reason management cannot provide the shady area or proper sitting places at the site. The possible policy recommendation for this problem is the provision of mobile shades or sitting facilities at the site so when the water level is raised then these mobile shades could be transfer to other place.
2) Visitors are also willing to pay additional entrance fee, in order to have improved services or provision of facilities at the site. So the increment in fee could be done in a way that the number of visits could not go down. According to price elasticity of entry fee, RS 40 is the

best additional entry fee which people are willing to pay resultantly the revenue of Mangla Dam can be increased up to many fold which may be used for improvements of facilities and maintenance of site.

3) Visitation rate can also be increased by introducing new fish species in the dam. If the management authorities introduce new fish species and could make sure the availability of sustainable fishing equipment at cheaper rates, then more of people will come to the site and would be willing to pay higher entry fee.

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# Appendix A

## Questionnaire

This questionnaire is designed for MPhil thesis entitled "**ECONOMIC VALUE OF RECREATIONAL FISHING: A CASE STUDY OF MANGLA DAM, MIRPUR AZAD JAMMU AND KASHMIR**". The information collected through this questionnaire will use purely for academic research and will remain confidential.

### A: General Information about the Visitor

A: 1. Name _____

A: 2 Gender of the respondent:

a) Male
b) Female

A: 3. Age _____ (years)

A: 4. Marital Status (please circle one):

a) Single =0
b) Married =1

A: 5. Household Size: _____ (No. of Family Members)

A: 6 Years of schooling _____

A: 7 Income of the household? _____ (Rs. /month):

A: 8: What is your employment status?

a) Employed (1)
b) Not employed (0)

A: 9 are you retired?

a) Yes =1
b) No = 0

A: 10 where do you live? _____

## B: Visitor's Recreational Behavior

B: 11 How many times did you visit recreational sites Mangla dam within 1 year for recreation purpose? No. of times: _____.

B: 12. How much time did you spent at Mangla dam per visit? _____ Hours.

B: 13. Please estimates the time and distance it took you to get to the Mangla dam from your home? _____hours _____ km.

B: 14. How did you come to Mangla dam?

a) By Tour Bus= 1
b) by mini bus=2
c) by taxi=3
d) by private car=4
e) by motorcycle=5
f) by public bus=6
g) Other =7

B: 15. How much did you spend on your trip from your destination to this site today?

a) Transportation _____ Rs. (in case of public transport)
b) Fuel _____Rs. (if private/own vehicle)
c) Food _____Rs.
d) Accommodation _____ Rs.
e) Other _____Rs.
f) Total _____Rs

B: 16 if you were not on this trip today, what would you most likely be doing?

a) Working at job =1
b) Other recreational site for fishing =2
c) Housework/Shopping =3

d) Other (Specify) =0

B: 17 Do you pay any cost to fishing?

a) Yes=1
b) No=2
c) If yes then specify the cost

B: 18 What is your purpose of visit?

a) For attending conference = 1
b) Business purpose =2
c) Visiting friends or relatives =3
d) Recreational Fishing =4
e) any other =5

B: 19 Do you visit any other site for fishing?

a) Yes=1
b) No =0

B: 20 How much did it cost you to go to this alternate site? _____Rs/

B: 21 How would you describe quality of fishing at Mangla dam?

a) Very poor=1
b) poor =2
c) fair=3
d) good=4
e) excellent= 5

B: 22: Are you satisfied with the existing recreational facilities provided by management at the Dam?

a) Yes=1
b) No =0

B: 23: If No then would you like to see improved recreational facilities provided by the dam?

a) Yes=1
b) No=0

B: 24 What types of improvements would you like to have? Specify

B: 23 What type of financing can be used to improve the services?

a) Increment in entry fee =1
b) government budget =2
c) donations = 3

B: 24 If increment in entry fee, how much you are willing to pay?

B: 25 Please prioritize the issue mentioned below for upgrading recreational facilities?

a) Environment cleanliness =1
b) Parking facilities=2
c) Availability of washrooms = 3
d) Sitting area =4
e) Boat rent =5
f) hoteling =6

## C: Visitor's Attitude towards improvement in catch rate at site

C: 25 A fish stocking program and better monitoring could improve the amount of fish that people could catch at the dam. The program could be paid for by charging visitors for weekly fishing permits. (The next question is hypothetical – there is no current intention to impose weekly permits).

If the price for a weekly fishing permit increased, in order to improve your catch rate would you still come for fishing to Dam?

a) yes
b) no

C: 26 suppose there were no option to improve the stocking program other than increasing or imposing permit fee. Would you willing to pay this fee?

a) yes
b) no

C: 27 if the permit fee were Rs.80, would you be willing to pay it to visit the Mangla Dam?

a) Yes

b) No (go to c:30)

C: 28 Suppose that instead of Rs. 80 the permit fee was Rs. 100 In this case would you willing to pay this higher fee?

a) Yes

b) No

C: 29 Suppose that instead of Rs. 100 the permit fee was Rs. 120. In this case would you be willing to pay the entry fee or not

a) Yes

b) No

C: 30 Suppose that instead of Rs. 80 the permit fee was Rs. 60. In this case would you be willing to pay the entry fee or not?

a) Yes (finished)

b) No (go to 31)

C: 31 Suppose that instead of Rs. 60 the permit fee was Rs. 40. In this case would you be willing to pay the entry fee or not?

a) Yes finished

b) No

C: 32 What is the Maximum amount, you would be willing to pay for additional entry fee? Rs_____

C: 33 If you are willing to pay for improved quality of recreational services in the near future, perhaps you may wish to come to the Mangla dam and spend more time for fishing. How many more times would you then be here? _____ Visits/ year.

# Appendix B
# BID ELASTICITY

| **Bid_80** | Freq. | percent | Cum. |
|---|---|---|---|
| **0** | 104 | 41.60 | 41.60 |
| **1** | 146 | 58.40 | 100.00 |
| **Total** | 250 | 100 | |

Table 1

| **Bid_100** | Freq. | percent | Cum. |
|---|---|---|---|
| **0** | 125 | 50.00 | 50.00 |
| **1** | 125 | 50.00 | 100.00 |
| **Total** | 250 | 100 | |

Table 2

| **Bid_120** | Freq. | percent | Cum. |
|---|---|---|---|
| **0** | 137 | 54.80 | 54.80 |
| **1** | 113 | 45.20 | 100 |
| **Total** | 250 | 100 | |

Table 3

| **Bid_60** | Freq. | percent | Cum. |
|---|---|---|---|
| **0** | 70 | 28.00 | 28 |

| | | | |
|---|---|---|---|
| **1** | 180 | 72.00 | 100 |
| **Total** | 250 | 100 | |

Table 4

| **Bid_40** | Freq. | percent | Cum. |
|---|---|---|---|
| **0** | 57 | 22.80 | 22.80 |
| **1** | 193 | 77.20 | 100 |
| **Total** | 250 | 100 | |

Table 5