Non-marketed Valuation of Khanpur Lake using Travel Cost Method

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Abstract

The study employed travel cost method to find non-marketed recreational benefits of Khanpur Lake, which is a tourist spot located in the vicinity of Islamabad. Primary data was gathered from 150 respondents and a Zero-truncated Poisson model was estimated. The results show that the travel cost has a significant negative effect on the rate of visitation to the lake. Consumer surplus is estimated using the estimated model accounting for both the week days and weekends. The estimated cost per trip per visitor turns out to PKR 3,333 that amounts to recreational benefits equivalent to PKR 121.2 million annually. The respondents were asked about their choice for willingness to pay for improvement in on-site services and tourists' willingness to pay turns out to be PKR 50 per head that can be charged in the form of entry fee. This amount may essentially be used for development of the site, increasing the recreational value and therefore, visitors' demand and consumer surplus. The finding points to an important policy implication that visitation can be increased by attracting investment for creating new recreational activities along with the preservation of naturalness and wilderness of the site. By providing the infrastructure at the facility together with environmental improvements will promote tourism that would generate economic activity resulting in socioeconomic uplift of local community.

Keywords: Travel cost, zero-truncated Poisson model, Recreational benefit, Consumer surplus, Willingness-to-pay, Pakistan,

JEL Classifications: R41, H62

1. Introduction

Environmental goods are a source of recreational value that is usually estimated using the non-market valuation methods. These methods reveal respondents' willingness to pay (WTP) for a set of recreation activities on a site that is generally estimated either through revealed or stated preference approach. The estimates of the recreational value help in assessing and revising environmental policy and resource management decisions in order to improve the environmental conditions. Natural site of recreational value is usually a common pool resource and benefits of its naturalness are generally undervalued due to missing price for the resource. Putting too small a price on a resource may lead to over exploitation. Non-market valuation suits best in valuing such resources and quantifying benefits. These resources can be forests and mountains, and water bodies such as lakes, beaches.

The topic gained popularity in the early 1980s with the apprehension of environmental concerned in the developed countries. Recently, research interest is rekindled on this topic especially in the vulnerable developing countries also due to looming impact of climate change as it had threatened the conservation and existence of almost all natural resources. Amongst methods of non-market valuation, travel cost model (TCM) is generally used to value the recreational benefits of a tourist site that are associated with improved quality such as, wilderness, scenic beauty, access, safety, availability of recreational activities and the rest areas therein. This is a demand-based model that values goods and services based upon their access value (Clawson, 1959).

The access value is represented by travel expenses and time cost to reach a certain site. Different individuals face varying cost that represents the marginal benefit of visiting the site that affect their number of trips to the site. Past studies suggest that TCM is preferable because it relies on individuals' actual behavior and it helps in explaining the preferences depending upon socio-economic indicators such as age, education, and income that affect behavior (Herath and Kennedy, 2004; Blackwell, 2007; Vicente and de Frutos, 2010; Rolfe and Gregg, 2012; Mugambi and Mburu, 2013; Leh *et al*., 2018; Huang *et al*., 2019; Menendez-Carbo et al., 2020; Rehman and Jamil, 2021). The literature highlights that individuals make different forms of trips and this distinction is important in resource conservation and planning such as, sports-related and recreational, cultural, religious and monumental tours.

Pakistan is endowed with enormous natural recreational sites and tourist attractions especially in the north that are not fully utilized and only few recent studies measure their benefit using nonmarket valuation methods (for example, Khan, 2006; and Delhavi & Adil, 2011; Bertram & Larondelle, 2017). Khanpur Lake is located in district Haripur on the Haro River, 40 km away from the federal capital of Pakistan. This lake came into existence after the formation of Khanpur Dam in 1983. It is 167 feet (51 m) high and stores 110,000 acre-feet water. The lake supplies fresh water for drinking and irrigation purposes to parts of Islamabad and Rawalpindi. However, it has become a major tourist spot due to its jaw dropping serenity, glorious vastness with azure water and being surrounded by lush green mountains (Ejaz *et al*., 2012). The substitute sites of Khanpur Lake include Rawal Lake, Tarbela Dam and Shahpur Lake. Rawal Lake is located in Islamabad city while Tarbela and Shahpur lakes are 100 and 42 km from Islamabad respectively. This study provides an in-depth benefits' valuation of Khanpur Lake in Pakistan by identifying the factors that attract visitors to the site and estimate their willingness to pay for the improvements in the facility by employing travel cost model (TCM).

This study employed TCM to measure the factors that motivates visitation to the lake and find the consumer surplus by using data from an onsite survey. As the data is number of counts rather than continuous numbers, individual travel cost model (ITCM) is estimated using a Zero-truncated Poisson distribution. Besides the lake, the area is a natural habitat of diverse flora and fauna, and serves as a sanctuary for migratory birds from Siberia. Although this region is predominantly a rural area but has a diversity of both developed and wild settings and is rich in natural amenities. Irrigation facilities of Khanpur Dam converted arid lands in the vicinity into productive farms and orchards, thus raising substantially the income of local farmers. The dam also contributes in local economy by attracting a large number of tourists. Tourism Corporation of Khyber Pakhtunkhwa (TCKP) arranged water sports gala at the Khanpur lake in 2010, which attracted both local and foreign tourists offering recreational sports such as boating, jet skiing, cliff diving and rides.

The findings suggest that travel cost is inversely proportional to the rate of visitation at the site. The consumer surplus turns out to be PKR 3,333 per trip giving an annual use value of PKR 121.2 million (approximately US $1.16). Furthermore, the survey shows the consumers' willingness to pay an amount equivalent to PKR 50 for improved quality of recreational services at the site in the form of a fee or development charge. Rest of the paper is as follows. Section 2 presents the model. Empirical methodology and data is described in Section 3. Section 4 gives the results and discuss the findings. Finally, Section 5 concludes the study and provides recommendations.

2. Travel Cost Model

The theoretical basis of TCM follows the theory of consumer behavior such that an individual consumer maximizes its utility from consumption of goods and services subject to a budget constraint. The solution for the problem of constrained optimization results in the Marshallian demand functions. Microeconomic theory of consumer behavior is pertinent in case of private goods as compare to public goods or environmental resources. An individual who visits a recreational site is consuming two goods that is, a recreational good denoted by rec_{ij} and composite good denoted by x_i. The individual optimizes utility subject to both budget and time constraints. The individual maximizes the utility function as given below.

$$U_{ij} = U(x_i, rec_{ij}) \quad (1)$$

where rec_{ij} is the recreation of individual i at the site j. The budget constraint of the ith individual visitor is as follows.

$$Y_i = wT_w = P_x x_i + P_r rec_{ij} \quad (2)$$

where

Y_i= income level of the individual consumer i,

w = hourly wage rate,

p_r = price of the recreational good,

p_x = price of composite good,

T_w = total number of hours worked.

The individual visitor faces a budget constraint and time constraint because he has to decide as how much time to allocate for work and leisure. The time constraint is stated as follows.

$$T = T_w + T_l \quad (3)$$

T = total time endowment

T_l = time devoted to leisure

As travel cost to a recreational site is key determinant that influences the choice to visit that site so the travel cost of individual is taken as a function of demand for recreational good. Thus the generalized form of Marshallian demand functions for composite (private and public) good and recreational good are as given.

$$x_i = g(P_x,\ P_r,\ Y_i) \quad (4)$$

$$rec_{ij} = f(P_x,\ ttc_i,\ Y_i,\ Z_i) \quad (5)$$

Equations (4) and (5) represent the ordinary demand functions where Y_i represents the monthly income of individual and Z_i is the vector of individual's social and demographic characteristics such as age, gender, residence, experience of on the site activities. It seems a valid assumption that the conservation and improvements of the recreational goods depend on the value assigned to these resources by the society. TCM helps to estimate this value and overall consumer surplus. This method is based on the fundamental premise that the frequency of visits to a recreational site decreases as the travel distance increases. The decreased visitation is indicative of the fact that financial as well as opportunity cost of time is increasing for the individual that leads to an overall increase in travel cost. Thus, the demand for recreation trips is determined by travel costs, price variable, and other site related characteristics and socio-demographic factors of the individual (Ward and Beal, 2000; Parsons, 2003; Sinclair et al., 2020). Within this modeling framework, our study estimates Equation (5) and the data contained in individual visitors' responses to a single recreation site. In a nutshell, the study uses an ITCM to estimate consumer surplus on a single-site for nature-based recreation.

Literature shows that recreation is a normal economic good and the visitors travel more frequently covering longer distances and spend more time on the site that reflect their demand for the site (Smith and Kopp, 1980; Creel and Loomis, 1990; Hellerstein, 1991; Parsons, 2003; Borzykowski et al., 2017; Pueyo-Ros *et al*., 2018; Soe Zin et al., 2019; He and Poe, 2021). The number of trips taken to a site in a season or year is used to show 'quantity demanded' while trip cost represents the price that is incurred in reaching to the site. Variation in the demand for different individuals may be a result of people living at different distances and incurring different travel costs. Thus, following equation shows the ordinary demand function.

$$rec_i = f(ttc) \tag{6}$$

where rec_i represents the number/quantity of trips taken by *i*th individual such that, $i=1, 2,\dots, k$ to site in past 12 months, and '*ttc'* the travel cost or price of a trip. We measure use rate such that a round trip represents one unit of consumption. In similar way, price per visitor per trip rather than price per visitor day is considered.

On one hand, *ttc* is the price that acts as policy indicating the consumer's willingness to pay for the recreational service offered by the site variable and on the other hand, it is also used for acquired benefits of the individual from the visit. When making a choice of including expenses in price, two related issues arise which are discussed following the study of Bishop and Heberlein (1979). The first issue is related to the choice of monetary expenses that are to be included in estimation of price of recreational site and second is about the measurement of time value. For monetary expenses, the variable costs of transportation is deemed a good estimate of financial cost.

The problem lies in measuring opportunity cost of time or travel time because it different from out of pocket expenses. In earlier studies, only variable cost of transportation of round trip was used as determinant of price for nearby visitors who had high frequency of visitation. Cesario and Knetsch (1970) and Nandagiri (2015) discovered that this cost alone is not sufficient for explaining the reason of less visitations of distant visitors that is joint effect of two important components i.e. transportation cost and travel time be used instead. Opportunity cost of time acts as important constraint when making a decision to visit a distant site, therefore this cost along with transportation cost is used to get total travel cost.

Other important factors influencing the demand of visitors includes variables such as, quality of natural resource, individual's experience of recreational activities that are available at the site, demographic factors (gender, age, education, and income) and cost of visit to substitute sites. The variable of substitute site is an important demand shifter. Caulkins *et al.* (1985) stated that if travel cost to a given site is positively correlated with that of substitute sites, and this cost is not included in total travel cost, the result would be a more inelastic demand curve. For avoiding this problem of model specification, the prices of substitute site need to be included as a determinant of demand for visitation at the site. Thus the estimable econometric model can be represented by Equation (8)

$$rec_i = f(ttc, Q, recp, sdem, tc_{sub}) \tag{7}$$

$$rec_i = \beta_0 + \beta_1 ttc_i + \beta_2 Q_i + \beta_3 rexp_i + \beta_4 sedm_i + \beta_5 tc_{sub_i} + \epsilon_i \quad (8)$$

Variable rec_i, can take an integer value from 1 to *k*. *ttc* is the travel cost at the site, *q* represents the quality of water, *rexp* is the experience of the recreational activities available at the site*;* and tc_{sub} is the travel cost of a substitute site. The βs are coefficients that would be estimated.

3. Empirical Methodology

For estimating ITCM, an appropriate functional form is of due importance because it assists in deriving the demand function and consumer surplus. The dependent variable is number of trips reported by the respondents at the site. The dependent variable that is rec_i has certain unique properties that if ignored, can result in biased estimates. Firstly, Ordinary Least Square (OLS) is inappropriate because this variable do not follow a normal distribution. For such a distribution, the numerical variable must be continuous but rec_i variable takes the counts of visits, which are discrete numbers. Therefore, for count data model, a Poisson method is applied as used by Shaw (1988) instead of OLS (Zin et al., 2019). In Poisson distribution, dependent variable is discrete, non-negative number (r = 0, 1, 2, …). The evaluation method to be used is Maximum Likelihood estimation represented by the following equation:

$$P_r = (r_i = n) = f(n_i, X_i\beta \quad ; \; n = 0, 1, 2, \ldots \quad (9)$$

$$P_r = (r_i = n) = \frac{e^{-\lambda_i}\lambda_i^n}{n!} \;\; ; n = 0,1,2, \ldots, \qquad n=0,1,2,\ldots \quad (10)$$

where λ *i*s the parameter of Poisson distribution showing equal mean and variance.

The study used the on-site sampling approach and the questionnaire was distributed to visitors that were found present at the site, therefore our dependent variable only takes positive number of trips that is, there is no observation with zero trips (truncation). The non-visitors essentially excluded from sample due to the adoption of on-site survey approach. On-site survey is a suitable choice in the case of time and resource constraints. It also is difficult to gather travel cost data based on the revealed preference approach as they have not visited the site in that particular time period. The counts are taken over a finite time period, which is twelve months in this case. Taking into consideration the following characteristics of our dependent variable, a Zero-Truncated Poisson distribution is used. Its functional form is derived from a standard Poisson distribution $f(r; \lambda)$ which is as followed.

$$f(r;\lambda) = P(X = r | X > 0) = \frac{f(r;\lambda)}{1-f(0;\lambda)} = \frac{\lambda^r e^{-\lambda}}{r!(1-e^{-\lambda})} \quad (11)$$

The functional form of our model will be Log-Lin showing that dependent variable *'rec'* is positive number therefore travel cost function take the following log form:

Taking natural Log on both sides gives the following equation.

$$\ln(rec_i) = \beta_0 + \beta_1 ttc_i + \beta_2 Q_i + \beta_3 rexp_i + \beta_4 tc_{sub_i} + \beta_5 age_i + \beta_6 Province_{Kp_i} + \beta_7 Income51k_i - 200k + \beta_8 Income_i - above200k + \beta_9 Female_i + \beta_{10} Residential\ location_i + \beta_{11} Employment_i + \epsilon_i \quad (12)$$

Consumer surplus for each trip would be equal to an inverse of β_1 such that, $CS_{pertrip} = - 1/\beta_1$. The target population is the visitors to Khanpur Lake who come for recreational activity on the site. It is a representative sample and survey was conducted in the year 2017. The sample comprises of respondents surveyed both during week days and weekends. A randomly chosen sample of 150 respondents from the site were interviewed. Further the design of questionnaire is such that it covers complete detail on the variables presented in the model. First part contained questions about socio-demographic characteristics. Second part was about the cost of travelling as well as opportunity cost of time incurred followed by the question assessing the experience in major recreational activities available at the site. Fourth section covered the site quality and willingness to pay for improving the facility. The final section was about choice of substitute site(s). Mostly close ended questions were asked depending upon the nature of the variable. The variables used in the Equation 8 are explained in Table 1.

4. Results and Discussions

The results in the first part is obtained from the questionnaire showing descriptive statistics. While in second part the estimated results are given based on estimation of the model.

4.1 Descriptive statistics

An overview of visitor profile depicts that most of the visitors were male i.e. 62%, most of these visitors fell in the age category of 17-25 i.e. 40% followed by 26-40, 35%. On seeing the marital status of these visitors, they were mostly married making 58% of the total size, the reason being that people travelled in family group. As far educational status is concerned most of the respondents stated that they belonged to bachelors group which is 45%, while 44% of them fell in the category of masters and above. Almost 43% of the respondents were students while 24% were self-employed followed by permanent salaried employed, i.e., 19%. The 21% of visitors fell in income category of 21,000-50,000. Majority of the visitors were from urban settings i.e. 79% and the rest 20% to rural area.

The site of Khanpur dam is surrounded by Taxila museum, orchids and Julian site that can be treated as complementary sites in the trip. Most of the visitors were from Punjab (50%) followed by KP 42%. Among the total sample, the main purpose of visitation of 54% of visitors was Khanpur Lake. While out of remaining 46%, 62% stated to be mainly visiting Taxila Museum, 24% were visiting the orchids, 4% Julian and 10% had any other purpose.

Table 1: Description of Variables

Variable	**Description**
ttc	Vector of trip cost incurred for visiting the site which include fuel cost, toll fee, entry fee, time cost both for individual as well as those using shared transport
Quality (Q)	Represents site and water quality
Experience (rexp)	Represents the visitor's experience of major recreational activities performed at the site like boating, cliff diving, jet ski, site seeing and riding
tc_{sub}	Travel cost of trip to substitutes sites
Age	Age of the respondent
Province	KP is base category treated as 0, otherwise 1
Income 51k-200k	Treated as one if the income of the respondent is in between the given bracket: Base category is income lower than 50k
Income above 200k	Treated as 1 if the income of the respondent is more than 200k otherwise 0
Female	Treated as 1 if gender is Male, 0 otherwise
Residential Location	Treated as 1 if the respondent is resident of urban area, 0 otherwise
Employment	Treated as 1 if the respondent is employed, 0 otherwise

The most appealing attribute of Khanpur Lake was its 'naturalness/scenic beauty' for 86% of respondents. In the end a question on required improvements showed that 47% of respondents wanted a proper waste disposal and for family recreation, 36% desired restricted place for families. The question on rating the quality of a site (land, water and the facilities provided there that served as an increase in visitation) showed that 36% respondents deemed site quality as 'good' while for 28% it was 'fair' and the rest of 21% thought it as 'poor'. The reason given by 82% respondents for poor site quality was 'littering by visitors'. Moreover a large number of respondent (74%) were of the view that 'government financing' should be a mode of payment for improving site quality. The 93% of visitors were 'willing to pay' in case if there was no other source of finance available for making the desired improvements on site. The justifiable they were willing to pay was PKR 50 reported by 51% respondents.

4.2 Estimated Results

After the estimation of the empirical model given in Equation (12) the results turned out to be consistent with the individual travel cost model. In addition, they are also statistically significant in most of the cases. The estimation results are given in Table 2. As this is a nonlinear model, R^2 is not of particular importance. Instead, likelihood ratio statistics is important. Its value is 82.24, which is significant at 1% level. This means that explanatory variables explain the number of trips (*rec*). *Sdem* is a dummy variable that includes age, monthly income of the respondent, gender, employment status and province he live in. For age the base category was '25 and below', while for province it was 'Punjab and other provinces'. The base category for income and gender were '50,000 and less' and 'male' respectively. Lastly for the residential location and employment status the base categories were 'urban' and 'unemployed' respectively.

The estimated coefficient of travel cost is -0.0003, which implies that with an increase of PKR 10,000 in cost to reach Khanpur Lake, the number of trips will decrease by 3 units on average which is significant at 1%. The reason being that because of large expenses faced by visitors (fuel cost, higher opportunity cost of time and other expenditures) lead to reduction in their number of trips. These findings reject the null hypothesis and show that travel cost affect the rate of visitation significantly. This finding is consistent with the previous studies such as Sanchez (2008) and Mendes (2003) for developed countries and Dehlvi and Adil (2011) for Pakistan.

The site quality including the cleanliness and environmental quality of the lake is found insignificant. The results based on the visitor's level of satisfaction suggests that quality variable (as it is defined) does not matter hence, the role of additional improvement in quality does not affect the number of trips to the site. Similarly, the variable of travel cost to the complementary sites such as Taxila museum and orchards has a negative sign. It implies that when the cost to these sites increases, the trips to the lake will also decline although the variable is statistically insignificant.

Experience of water related recreational activities available at the lake appears significantly in the model showing that the rate of visitation to Khanpur lake increases as the experience of an individual increases. Experience accounts for the visitor's level of experience in different activities such as boating swimming, cliff diving that are offered at the lake. The results reveal that for every unit of increase in experience of recreational activities, the number of trips increase by 13% and interestingly, this variable is found highly significant. As Khanpur lake is a hub of all these activities, people with liking for these activities will visit more often. Our result for the recreational experience is consistent with the Morgan and Huth (2011) and Shrestha *et al*. (2007).

The interpretation of dummy coefficient in case of semi-log model is as follows. As compared to age group of “25 and below”, visits of people of age group ‘above 25 age’ is by $100[e^{0.478} - 1] = 59\%$ lower and is significant at the 5%. The reason is that young people tend to visit more frequently to recreational sites and the activities available here are more appealing for the youth like diving, swimming, paragliding etc. Moreover, as age increases individuals engage considerably more towards the economic activity thus decreases the leisure and recreational activities.

The residential location of the respondent covered through the province variable has a significant impact on the rate of visitation. Individuals from the province of KP visits $100[e^{0.56}$-1] =64% more as compare to individuals from Punjab and other provinces and the variable is also statistically significant at the 5% level. The reason is that Khanpur lake is situated in the KP province and due to proximity, people of this province visits more frequently. In addition to travel cost, monthly income has a positive impact on number of trips, i.e., as compared to category of ‘50,000 and less’, the higher income group of ‘MI51,000- 200,000 a1hd1’ has $100[e^{0.24}$-1]= 46% less visits. The reason being that sample size mostly comprise of unemployed people. As the cost of trip is not high this variable is insignificant. Economic inactivity induces more visitation, as seen in the table. “Females” tends to visit more frequently as compare to “male counterparts” and is highly significant. Similarly, “rural residents” visits 41% more than the “urban” and “unemployed” has 53% more visitation than the “employed” counterparts.

4.3 Calculation of Consumer Surplus

For our Poisson model, the estimated consumer surplus turns out to be PKR 3333 by using the formula give in equation 5, (negative inverse of the travel cost coefficient).

$$CS\ (PKR) = -\ 1/\beta_1 = -\ 1/\text{-}0.0003 = 3333$$

The low consumer surplus is consistent with the results obtained from previous studies for the developing countries such as, Day (2000) estimated consumer surplus of USD 18.6 for natural reserves in South Africa while Bilgic and Florkowski (2007) obtained consumer surplus of USD 161.

Table 2: Zero-truncated Poisson Regression Results

Variable	Coef.	Std. Err.	Z	P>z
Travel Cost (*ttc*)	-0.003	0.000	-3.20	0.001
Quality *(Q)*	0.029	0.528	0.55	0.581
Experience *(rexp)*	0.138	0.022	6.32	0.000
Cost_Sub_Site (tc_{sub})	-0.000	0.000	-0.96	0.336
Age	-0.478	0.196	-2.43	0.150
Province_KP	0.564	0.139	4.07	0.000
Income51K-200K	-0.247	0.182	-1.35	0.176
Income-abv-200K	0.027	0.280	0.10	0.922
Female	0.406	0.188	2.16	0.031
Residential location	0.358	0.169	2.11	0.035
Employment	0.433	0.175	2.46	0.014
Constant	-0.646	0.364	-1.79	0.074

5. Calculation of Recreational Use Value

Recreational use value is sensitive to the rate of visitations, that is, with an increase in number of visitors, more revenue would be generated with the same entry fee. Recreational use value estimates are based on an annualized mean consumer surplus per visit of PKR 3333 assuming 200 tourists during week days and 500 tourists on the weekend (Delhavi and Adil, 2011). Table 3 give the annual recreational use value, in case of our study that amounts to PKR 121 million.

Table 3: Total Recreational use Value of Khanpur Lake

Item	Days Count	Cost per head (PKR)	Visitors per day	Recreational use value (PKR Million)
Week days	313	3333	200	34.662
Weekends*	52	3333	500	86.658
Total Value				121.320

Note: * Only Sunday is considered as weekend in the analysis. The use of visitors on the week days and weekends is counted twice for both types and took a rounded of average.

6. Conclusion

The study identifies the key determinants of non-marketed recreational in the light of our objectives of determining the visitors' recreational demand, willingness to pay for improving the site quality. An estimation of consumer surplus of a visitor per trip to Khanpur Lake is carried out. The study gathered data through an on-site survey and 150 visitors were interviewed at the Khanpur Lake on different week days and weekends during August and September 2017. The survey was conducted using a structured questionnaire and random sampling was adopted and responses are analyzed using ITCM.

The results reveal that there are many factors that tend to influence the demand of visitation and the most important is travel cost. With increase in travel cost, the rate of visitation is negatively affected. Similarly, various other factors like quality of site, its attributes like naturalness, infrastructure etc. and experience of on-site activates including boating, swimming, cliff-diving increased the visitors' demand and the recreational value of the site.

The primary date shows that there is an adequate willingness to pay for an entry fee among the visitors of the lake if it is associated with an improvement in the facilities, infrastructure and amenity services. This pointed towards the fact that the revenue generated through the entry fee can be treated as development charges of the site. The annual recreational use value obtained through calculating consumer surplus turns to be sufficiently high. This is the direct consumptive value of the site, which implies that the site has potential in coming future to give more value by preserving the wilderness of site as well as making more recreational activities available for the visitors. The data set is quite small and more robust results can be achieved by increasing the sample size. Moreover, the analysis for multiple sites can be of interest for the natural resources preservation and development. In the light of our findings following are the recommendations.

- Government can increase consumer surplus by providing facilities like proper sitting arrangement with shades, separate washrooms for male and female visitors, separate family area, emergency first aid facility and experienced divers in case of drowning.
- As natural scenic beauty was the most valued attribute and source of increased visitor's demand of the lake, government should take initiatives to give it a status of nationally recognized natural site to preserve it for future use also.
- Civic participation and awareness is also important for maintaining quality of this place.
- TCKP can arrange events for water sports at the Khanpur Lake on annual basis for attracting both local and foreign tourists to participate in water sports.

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