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Abstract

Estimation of recreational benefits is an important tool for both biodiversity conservation and ecotourism development in national parks and sanctuaries. The design of this work is to estimate the recreational value and to establish functional relationship between travel cost and visitation of Lawachara National Park (LNP) in Bangladesh. This study employed zonal approach of the travel cost method. The work is grounded on a sample of 422 visitors of the LNP. Results showed that the total value of environmental assets of the LNP is 55,694,173 Taka/Year. Moreover, our suggestion based on visitors' willingness to pay is that the park entrance fee of 25 Tk per person should be introduced that could generate revenue approximate 2.3 million Taka/ year, beneficial for the park management and conservation of biodiversity.

1. Introduction

National parks and sanctuaries are established to conserve the biodiversity and as a keystone for flora and fauna of these habitats (Reeves, 2000). In Bangladesh however protected areas haven't been managed to their best due to number of reasons. Some of the major issues are conflicts between management and locals, poor and inefficient management facilities, absence of proper monitoring, lack of awareness among the people (Mukul, 2007). One of the solutions to multitude of problems mentioned could be ecotourism as some national parks not only act as a safe haven for animal and plants but also can be good recreational place for people hence the source of money (Farnham, 2007). Ecotourism can play an important role in ensuring both natural resource conservation and economic growth (Khan, 2004). A growing

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body of literature stresses the role ecotourism can play in managing national parks and protected areas (Rana et al., 2010). In this context, Bangladesh has also introduced and revitalized its nature based tourism in the protected areas in cooperation with folks, i.e. local people to conserve biodiversity (Salam et al., 2000). But the park entry fees are often low and sometimes non-existent to generate sufficient revenue for park management (Khan, 2004). Furthermore, revenue earned from tourism is frequently merged with other general revenues which are not earmarked for park maintenance (Shah and Gupta, 2000).

Lawachara National Park (LNP) is one of the important tourist spots in Bangladesh. The number of visitors in this park is increasing everyday (Ahsan, 2007). Like any other environmental resources and public goods, LNP is beneficial to society in many different ways (Rashid et al., 2013). It performs not only ecological functions but also provides recreational facilities to those who visit this area. It also contributes in earning precious foreign exchange by foreign vistors (Chase, 1998). This park is used extensively by people for various types of recreational activities such as seeing the rees and landscape, wildlife-watching, and enjoying fresh weather of nature (Rahman, 2012). Hence, economic valuation of this environmental resource can provide valuable information for the better management of LNP in order to formulate a tourism management plan to generate more revenue from the park. In addition, in Bangladesh it is essential to develop a national policy relevant with ecotourism in national parks and sanctuaries which can be helpful for respective authorities to earn more revenue without causing harm or disturbance to park biodiversity. Our research has calculated the relationship between zonal travel cost and LNP park visitation, and its environmental asset value. We also analyzed whether improvement in recreational benefits of the park can lead to higher demand for visitation.

2. Research Methods

2.1. Study Area

The study is conducted at the Lawachara National Park in Bangladesh. Lawachara National Park covers approximately 12.5 square kilometers of semi-evergreen forests of the tropical and subtropical coniferous forests biome, and mixed deciduous forests of the tropical and subtropical moist broadleaf forests biome (NACOM, 2003). Geographically, it is located between 240 30′ N to 240 32′ N latitude and 91037E to 91039′ E longitude, which is approximately 234 km northeast of Dhaka, a civil administrative units of Kamalganj Upazilla, Maulvibazar District, Sylhet division (Figure 1). The forest soils of Lawachara Park can be

categorized as hill brown sandy loams with slight to strong acidity. They are shallow over sandstone bedrocks on high hills and accumulation of humus on the top of the soil due to rapid decomposition of debris under moist and warm tropical conditions. The climate of Lawachara is generally pleasant to warm, as the average temperature is 26.8 °C in February to 36.1 °C in June. The humidity is high throughout the year, and Lawachara experiences frequent rains with occasional cyclonic storms (NACOM, 2003).

Figure 1. Study area (marked in red).

2.2. Travel Cost Method

This study employs travel cost method (TCM) to assess the benefits associated with recreation in Lawachara National Park. The TCM is basically an extension of conventional household production function (HPF) models that treat the household as maximizing utility based on numerous consumption and production decisions. The TCM, which is also known as a zonal model (Clawson and Knetsch, 1966), estimated as a trip generating function where the visit rate depends upon the cost of travel to the site, travel costs to substitute sites, and other socioeconomic characteristics of the visitors (Garrod and Willis, 1999; Wood and Trice, 1958). In this approach, the area around the site is divided into several zones and travel costs for each zone are calculated. The regressing analysis is made with the number of visits from each zone against the travel costs. People's willingness to pay for the given site is expressed as cost per visitor day. The zonal model has been used in this case study.

In general, the total cost for each individual "i" to visit a given site "j" can be represented by the following function (Hanley and Spash, 1993),

$$C_{ij} = C(DC_{ij}, TC_{ij}, F_j), \text{ where, } i=1\ldots\ldots n.$$

Where, C_{ij} = Total cost for individual "i" to visit site "j"; DC_{ij}= Distance costs for each individual depending on the distance the person has to travel and the cost per mile of travelling; TC_{ij}= Time costs, which include the time spent in travelling to the site, the time spent inside the site and the

value of the individual's time; Fj= Entrance fee to the site.

Moreover, the value of the recreational uses (V) for each zone can be calculated followed by the simple equation:

$$V = \{(T \times w) + (D \times v) + Ca\} \times Va$$

Where, T = Travel time (in hours); w = Average wage rate (Tk/hour); D = Distance (in km); v= Marginal vehicle operating costs; Ca = Cost of admission to asset; Va= Average number of visits per year for each zone.

2.3. Data Collection and Analysis

We have used semi-structured questionnaire for data collection in December 2012 for seven days including weekends. We have selected random individuals who visited the park as a respondent. The total number of visitors to the site over the seven day survey period was 8,862 (LNP pers. Communication), and among them 450 visitors were randomly selected for questionnaire survey. During the survey, 28 respondents were discarded as they were not able to give sufficient information for the study. A factor of (8,862/7)/422=3 was used to estimate the actual number of visitors per day (VR). Statistical regression was carried out to determine the correlation between dependent and independent variables using SPSS.

3. Results and Discussion

The highest number of sampled visitors (49%) came from Dhaka city which is about 234 km away from the park and visitors of Dhaka spent 1294.44 Tk for their visit (Table 1). While, 18% visitors came from the Sylhet city which is 84 km away from the park, visitors of Sylhet spent 451.76 Tk for visit. There were 28, 27 and 12 visitors from Comilla, Moulavibazar and Habigonj respectively. Visitors' travel cost of these cities are 1090.70 Tk, 266.70 Tk and 486.02 Tk respectively. From rest of the districts got less than 10 visitors. The two visitors of Khulna district spent highest amount of money (2801.02 Tk) to visit LNP. The lowest travel cost was about 266.7 Tk for visitors from Moulavibazar which is the closest district. The result shows that maximum numbers of visitors were male (74.40%) and only 25.60% were female. Thus we can assume that there might some obstacles exist for female to visit the park. Reasons might be cultural as well as economic. It is also found that most of the visitors (80.10%) are from urban areas and the small proportion from rural areas. The visitors from urban areas seemed to have more demand for recreational facilities.

Survey didn't record a single visitor from Chittagong Hill Tracts (Rangamati, Khagrachari, Bandarban). This might be due to presence of protected areas and environmental

recreational site (such as national park, wildlife sanctuary, reserve forest, mountain etc.) in these districts and thus are not much interested in LNP. The maximum number of people (31.28%) who visited the park have monthly income 21000-25000 Tk. 18.48% and 11.14% visitors have monthly income 26000-30000 Tk and 16000-20000 Tk respectively. The rest (59.01%) fall in the income range 5000-25000 Tk (Table 2). We can say that there is a relationship between income and visitation. People who earn low income in Bangladesh normally cannot afford to visit recreational sites.
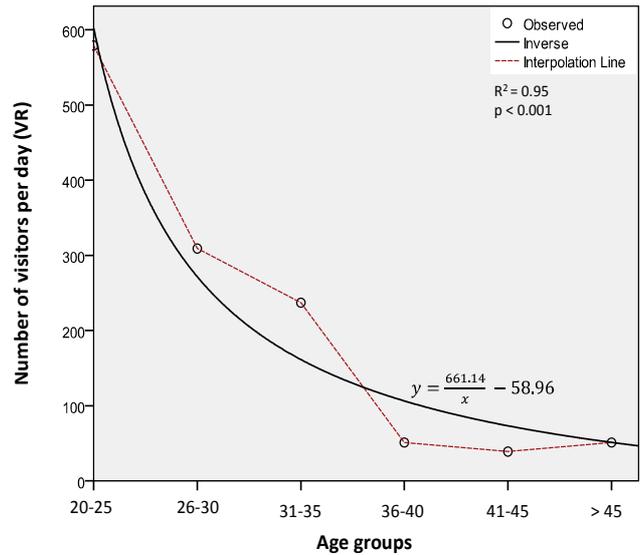

Figure 2. Visiting LNP by different age class.

It is also found that people with bachelor degrees visited the park the most. The actual number of visits varies with the educational level. People with higher level of education are more concerned about the environmental services and recreation, and they appreciate ecotourism. As many as 88.86% visitors see the need to improve the quality of LNP. They are also willing to pay more for better management of the park. Remaining visitors are satisfied with the current level of management of the park. The maximum number of visitors (45.73%) belongs to 20 to 25 years and least visitors (3.08%) belongs to 41-45 years. A regression analysis in Figure 2 shows the results of the fitting curve to describe the relationship between actual number visitors per day (VR) and age class. Relation between age and number of visitors is highly correlated (R^2= 0.95) and significant ($p < 0.001$).

For the zonal model with actual number of visitors (VR), Bangladesh is divided into seven zones namely Zone A to Zone G based on distance (Table 3). Travel cost from each zone to LNP is calculated. The highest number of visitors (264) are from zone C which is 201 to 300 km away from LNP and average travel cost for each individual of this zone is 1279.44 Tk. As seen from the table, travel cost increases

with the distance.

Table 1. District wise travel costs (Taka) and other TCM related data.

Districts	Number of visitors	Distance to the park (km)	Population	Travel Cost
Dhaka	208	234	11875000	1294.44
Sylhet	74	84	2443000	451.76
Comilla	28	207	5304000	1090.7
Moulavibazar	27	31	1902000	266.7
Habigonj	12	85	2059000	486.02
Narshingdi	7	190	2202000	978.68
Chittagong	6	450	7509000	2077.64
Brahmanbaria	5	136	2808000	696.64
Gazipur	4	230	3333000	1282.84
Manikgonj	4	273	1139000	1438.9
Bagerhat	3	604	1461000	2618.32
Dinajpur	3	536	2970000	2389.76
Jessore	3	564	2742000	2502.32
Mymensing	3	268	5042000	1424.4
Narayangonj	3	235	2897000	1297.34
Tangail	3	287	3571000	1510.86
Barisal	2	510	2291000	2314.36
Bogra	2	462	3371000	2143.8
Chandpur	2	227	2393000	1242.78
Chuadanga	2	498	1635000	2279.56
Feni	2	226	1420000	1208.52
Khulna	2	667	2294000	2801.02
Kishorgonj	2	208	2853000	1093.6
Laxmipur	2	287	1711000	1510.86
Madaripur	2	442	1149000	2054.44
Noakhali	2	285	3072000	1505.06
Pabna	2	414	2497000	1941.88
Potuakhali	2	553	1517000	2439.06
Rajshahi	2	442	2573000	2054.44
Sirajganj	2	331	3072000	1669.82
Chapainababgonj	1	519	1635000	2340.46

Table 2. Monthly income of park visitors.

Income	Observed Number of Visitors in seven days(V)	Actual Number of visitors per day (VR)	%
Up to10000	29	87	6.87%
10000-15000	41	123	9.72%
16000-20000	47	141	11.14%
21000-25000	132	396	31.28%
26000-30000	78	234	18.48%
31000-35000	46	138	10.90%
36000-40000	23	69	5.45%
> 40000	26	78	6.16%

Table 3. Zone wise visitors.

Zone	Distance from site	Population	Observed number of visitors in 7 days (V)	Actual number of visitors (VR)	Average travel cost (Tk)
A	0-100	6404000	112	336	414.85
B	101-200	5010000	12	36	861.16
C	201-300	46812000	264	792	1279.44
D	301-400	3072000	2	6	1669.82
E	401-500	18734000	16	48	2088.38
F	501-600	11155000	11	33	2411.23
G	601-700	3755000	5	15	2691.4

Table 4. Visits per population from different travel zones.

Zone	Distance from site	Population (P)	Observed Number of Visitors (V)	Actual Number of visitors (VR)	Visits per population (per 100,000)	Travel cost
A	0-100	6404000	112	336	5.25	414.43
B	101-200	5010000	12	36	0.72	861.16
C	201-300	46812000	264	792	1.69	1269.44
D	301-400	3072000	2	6	0.2	1669.82
E	401-500	18734000	16	48	0.26	2088.38
F	501-600	11155000	11	33	0.3	2411.23
G	601-700	3755000	5	15	0.4	2691.4

A regression analysis was carried out on the zones with the actual number of visitors (VR) as a dependent variable. Our assumption is that the number of visitors is inversely related to the travel cost. However, regression analysis didn't follow this simple assumption as we didn't take the population of each zone into consideration. For instance, zone C had the maximum number of visitors though the travel cost to LNP was not the cheapest. There is a good road connecting between LNP and Zone-C, so visitors of this area can easily visit to LNP.

The first zone (A) accounted for highest rate of visit per population (5.25 per one hundred thousands) where the cost of travel is lowest (414.43 Tk). The visits per population from zone C is about 1.69 per hundred thousand. About 0.2 per hundred thousands of them came from Zone D which is the lowest visit (Table 4). A regression analysis shows that number of visits per population is inversely related to travel cost incurred (Figure 3). This implies that the higher the travel cost to reach LNP, the less the numbers of visitors. The relation is significantly correlated with R^2 value of 0.89 with p-value smaller than 0.002.

The estimation of the environmental asset value of LNP for the seven zones shows that maximum value of the asset is 39,603,823 Tk for Zone-C followed by 6,219,600 Tk, 3,794,548 Tk, 2,956,680 Tk of Zone A, Zone E, Zone F respectively. The total value of the environmental asset of LNP is calculated near about 55.7 million taka per year. Visitors' willingness to pay for LNP calculated from dividing the total value of environmental asset by total number of visits per year. From the calculation, we estimated willingness to pay for each visitor is about 843.68 Tk per visitor day. This willingness to pay is biased by the fact that tourists who visit LNP have an intention to visit several sites of Sylhet division also. Taking this into considering, we consider only one third of 843.68 taka (i.e. 281.22 Tk) as the willingness to pay to visit LNP. Finally, we tried to understand the interest of people regarding the current entry fee for adults to see the possibility of increasing the revenue of LNP. 320 respondents (76%) thought that the current entry fee @ 20 Tk is low. About 189 respondents were willing to pay 25 Tk. About 36 respondents are willing to pay 40 Tk for LNP if tourist facilities are more improved (Figure 4).

Therefore the suggestion is to increase the fee from 20 Tk to at least 25 Tk.
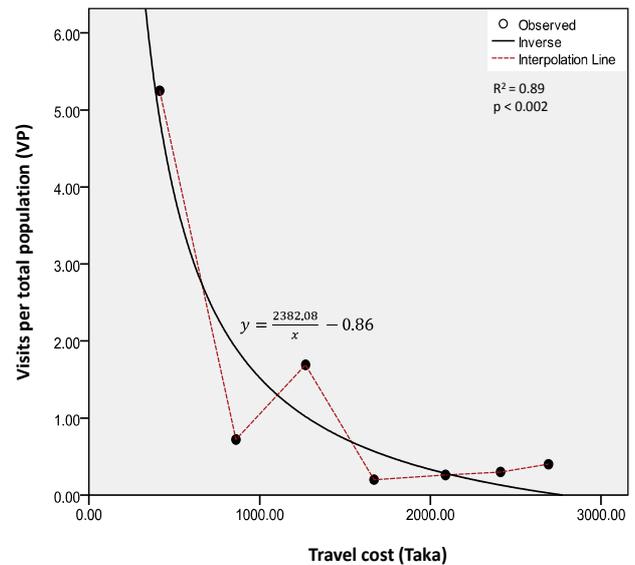

$$y = \frac{2382.08}{x} - 0.86$$

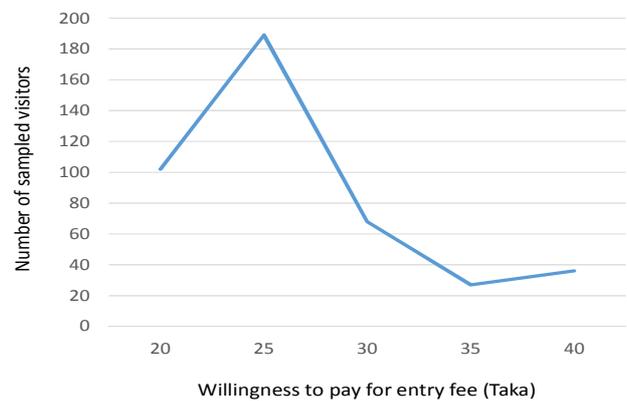**Figure 3.** Relationship of travel cost and visiting LNP.

Figure 4. Willingness to pay for entry fee by sampled visitors.

4. Conclusions

Given the growth of ecotourism and increasing interest among government and non-government organizations in natural resource conservation, non-market valuation techniques are needed to estimate the economic benefits of environmental resources such as national parks. Considering LNP as an ecotourism destination and its large amount of

recreational value, governments can initiate modern tourist friendly strategy. Our analysis shows that if the quality of LNP is improved, it will attract more visitors and generate higher revenue. Since majority of the visitors are willing to pay higher entry fee, and if it increases from 20 Tk to 25 Tk per visitor, would generate estimated 2.3 million Tk/ year, which could be used to improve LNP management and conserve biodiversity more efficiently. The result of this study could provide guidance for park management beyond the Lawachara National Park. There are several national parks in Bangladesh that require additional investment and expert support. Furthermore, present study will draw attention to the demand for nature and the benefits that accrue from investing in nature.

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