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Tourism recreational value of Biological park, Itanagar, Arunachal Pradesh, India

Domestic tourists visit Biological Park, Itanagar of Arunachal Pradesh state of India to have a glimpse of the wildlife of the region. Beautiful landscape and surroundings of the park make this site one of the favourite spots for them, both for recreational and educational purposes. A study was conducted during winter season of 2014-15 to quantify the recreational use value (one of the components of Total Economic Value) of the park. The travel cost method, which is now extensively used worldwide for estimating the economic use value of natural resources, has been used for the purpose. The main aim of the study was to find annual recreational use value of the park (Rs 34.71 million or US $ 0.53 million), consumer surplus per tourist visit accruing to the domestic tourists (Rs 534 or US $ 8.20), feasibility of park entry fee enhancement and recreational value per unit area of this park in comparison to other protected areas of India. The findings provide adequate justification for enhanced investment in the park to ensure continued flow of vital life supporting ecological, economic and socio cultural services.

Keywords: Recreational use value, Travel Cost Method, Consumer surplus, Entry fee

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Dr. Shashi Kumar is presently working as Principal Chief Conservator of Forests, Head of forest force and Principal Secretary, Environment and Forests to the Government of Arunachal Pradesh. He is from Indian Forest Service with 36 years of working experience in managing forests, wildlife and ecotourism. He has worked as Dy. Director, Forest survey of India; Associate professor, Indira Gandhi National Forest Academy; Director cum Vice chancellor, FRI Deemed university and Dy. Director General, Indian council of forestry research and education. He had attended national and international symposia with many research papers to his credit on the related issues.

Dr. Yogesh belongs to Indian Forest Service and after serving more than 31 years retired as Principal Chief Conservator of Forests & Chief Wild Life Warden, Arunachal Pradesh, India. He has wide field experience of management of forests including the sub-tropical rain forest, coastal & marine as well as dry deciduous ecosystem besides development and management of Zoo. He had worked as Field Director in Project Tiger (Namdapha) and a high altitude National park in Arunachal Pradesh. While working in National Capital Region of Delhi, being Wildlife Officer, Delhi he handled wildlife enforcement activities especially related to Rare & Endangered animal species. Prior to joining Forest Service, he has served as Lecturer of Botany for teaching graduate classes.

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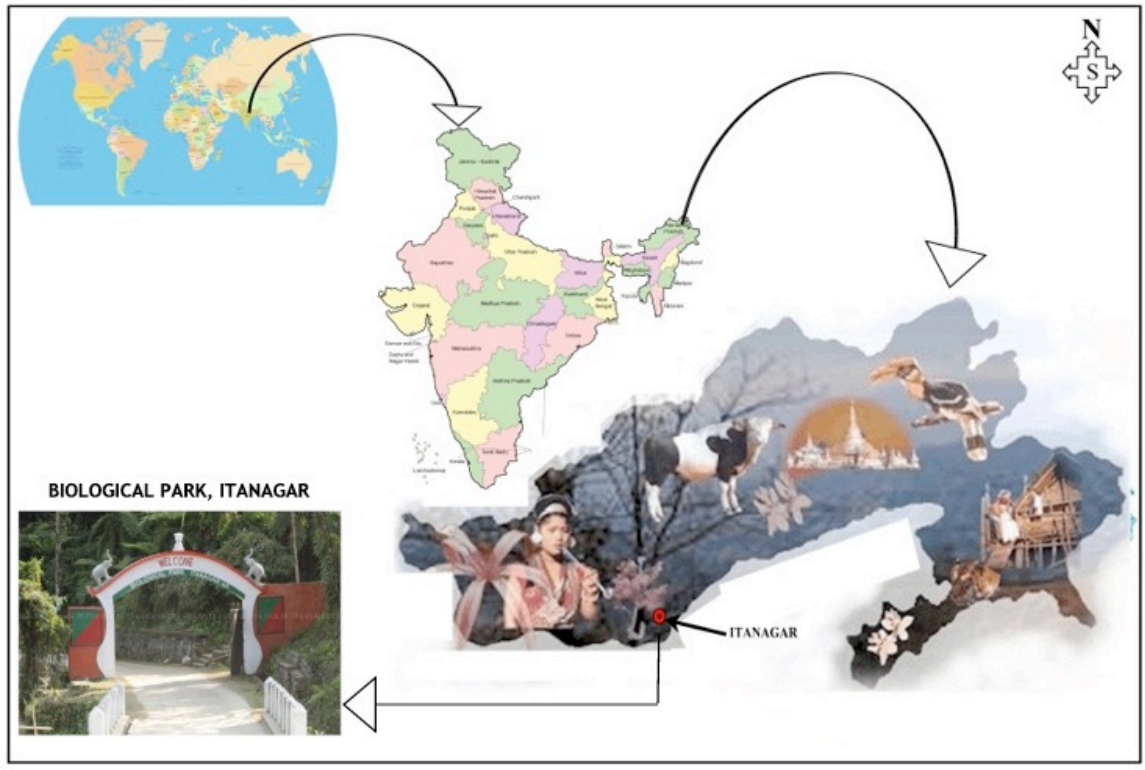
Introduction

Ever increasing human population, especially in developing countries, is posing a serious threat to natural habitat of wild animals. It has become necessary to educate the people about the conservation of precious wildlife and its habitat for the betterment of human beings as they are responsible for providing various life supporting ecosystem services to us. Most of the people in these countries tend to ignore intangible or non market benefits of forests and wildlife existing in their region. With a view to provide protection to wild animals, educating people about the forests, wildlife, conducting scientific research on wild flora and fauna and providing recreation to visitors, a number of National parks, Sanctuarires and Biological/zoological parks have been established in India.

Biological park of Itanagar in Arunachal Pradesh state of India is one of such ecological assets established in 1987 by the Department of Environment and Forests, Government of Arunachal Pradesh. The State of Arunachal Pradesh, also known as 'the land of dawnlit mountains' and 'the land of rising sun', is bestowed with a diverse variety of rich flora and fauna. Many of the rare, endangered and threatened species of animals and plants exist in its dense forests. Forest and tree cover of the state is about 68045 sq km out of the overall geographical area of 83743 sq km, covering altitudinal range from 100 to 7000 m. Due to large altitudinal range, the state has variety of forests ranging from tropical wet evergreen, semi evergreen, sub tropical, temperate to alpine forests. These forests are the storehouse of a variety of flora and fauna (Samal et al, 2013). The faunal diversity contains 96 species of mammals, 113 species of reptiles, 525 species of birds and 115 species of fishes. The floral diversity has about 4500 species of angiosperms, 34 species of gymnosperms, more than 550 species of orchids, more than 350 species of ferns and bryophytes, more than 70 species of bamboos and 17 species of canes (Tag and Das, 2004; Tag et al, 2008). With a view to conserve precious wildlife and floral diversity of the state, the state Government has established eleven Wildlife sanctuaries, one Orchid sanctuary, two National parks, two Tiger reserves, two Elephant reserves and one Biosphere reserve covering about nineteen percent of forest/tree cover of the state. Biological park of the capital city of Itanagar is the only 'medium category zoo' of the state which is recognised by Central Zoo Authority (CZA), an autonomous body of Ministry of Environment, Forests and Climate Change, Government of India. The CZA categorizes zoos of the country into four categories i.e. large, medium, small and mini zoos, depending on number of animals exhibited, number of species exhibited and number of endangered species exhibited. This park is located at a distance of about 3 km at the outskirts of the city and lies within the

Itanagar Wildlife Sanctuary with an area of 2.50 sq km (Figure 1). The vegetation is sub tropical evergreen forest with natural hillocks, streams and nallahs. The park has immensely beautiful landscape and surroundings, one can really relax and enjoy in the cool and quite atmosphere of the park.



Source: http://arunachalpradesh.gov.in/

Figure 1: Locational map of Biological Park, Itanagar, Arunachal Pradesh, India

A study was undertaken during winter season of the calender year 2015 with the main objective to estimate the annual recreational value of park amenities using 'travel cost method'. A questionnaire survey was undertaken among domestic tourists visiting the park during January to March, 2015 for collection of primary data for this method. Foreign tourists were not in sufficient numbers to be included in the analysis of this method.

About the park

The park houses thirty four species of animals and birds of the region. Main mammal species include Royal Bengal Tiger, Clouded Leopard, Common Leopard, Leopard cat, Barking Deer, Hoolock Gibbon, Himalayan Black Bear, Himalayan Palm Civet, Indian Palm Civet, Indian Porcupine, Jungle Cat, Slow Loris, Assamese Macaque, Sambar and Common

Langur. Main bird species consist of Oriental pied Hornbill, Wood owl, Brown Fish owl, Common Peafowl, Common Myna, Parakeet, Barbet, Spotted Dove, Silver pheasant, Emu, Drongo, Red Jungle Fowl, Love bird, Lady Amherst, King and Steppe eagle. Total number of animals housed in the park during March 2015 were 220, as inquired through the Park authorities.

Table 1 provides details about number of local visitors and revenue earned by the park authorities from the sale of entry tickets during last four years. A careful examination of the figures reveals that number of visitors, especially from nearby region, and subsequent revenue collection by way of sale of entry tickets, vehicles, camera etc in the park is increasing each year. This shows about the significance of the site for the local public who mostly come to the park for recreational purpose.

Table 1: Details about visitors and revenue collection in the Biological Park

Year	Number of visitors	Revenue earned (Rs/US $*)
2011-12	54,809	870,780/13,397
2012-13	62,100	979,950/15,076
2013-14	69,178	1,295,550/19,931
2014-15	73,939	2,393,780/36,827

*One US $ = Rs. 65

Economic valuation studies throw light on real worth of a National Park or Zoological/Biological Park or a Forest/wildlife reserve. Outcome of such studies are useful for policy and decesion makers, nature lovers, ecologists as well as economists as their economic worth vis-à-vis other parameters can be evaluated. For example, Australia's protected areas earn $ 1 billion per year, which is more than 30 times the cost to Government of running them (Phillips, 1998). Nepal's protected area tourism earnings are three times more than these areas budget of $ 3 million (Munasinghe, 1994). Protected areas in Kenya account for more than one third of foreign exchange earnings (Emerton, 1999).

Literature review

Environmental economists have devised mainly two kinds of techniques to estimate recreational benefits of natural resources like forests, wildlife, water bodies etc. Some of these techniques are based on stated preferences (Mitchell and Carson, 1989; Bateman et al, 2002) while others on revealed preferences in the market (Freeman, 2003). Among the later,

the travel cost method (TCM)[1] is the most popular technique to estimate recreational use value of an outdoor site. Harald Hotelling was the main architect of this method when he wrote a letter to the Director of the National Park Services, US mentioning a connection between the frequency of visits from a given zone and average cost of visit from that particular zone to the site and concept of consumer surplus[2] that could be derived from these observations (Hotelling, 1947). This idea was later applied and further developed by Clawson (1959) and Clawson & Knetsch (1966) in the so called zonal travel cost model. The zonal travel cost method (ZTCM) makes its estimations with the help of dividing individuals into different zones of origin, while the individual travel cost method (ITCM) makes its estimation by using each individual's travel cost (Ankomah and Adu, 2014).

The TCM has been used extensively to estimate outdoor rescreatinal services emanating from forests and protected areas in different parts of the world. For example, Hvenegaard et al (1989) estimated net economic value of bird watching at Point Pelle National Park, Canada and concluded that net worth of bird watching at this park was more than just dollars spent. Total bird-watcher expenditures to the park was estimated as $ 5.4 million for the year 1987, whereas net economic value of bird watching was found as $ 6.3 million during the same year. Mustafa (1994) estimated total annual net economic benefit for Sungai Congkak forest reserve in Selangor, Malaysia at RM 27772 while using zonal travel cost method and the consumer surplus per trip was RM 5.80. Norlida (2000) used zonal travel cost method to find economic benefit of forest recreational resources of Taman Negare National Park of Malaysia, which was assessed at RM 2.6 milliom per year whereas the consumer surplus per trip was RM 120.00. Raziah (2003) used individual travel cost method to evaluate the economic value of environmental resources at Malaysia Agriculture Park, the world's first agro-forestry park established in 1988 at Bukit Chahaya Seri Alam near Kuala Lumpur.

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[1]Travel cost method (TCM) is one of the methods used in environmental economics to estimate economic use value associated with environmental goods & services that are used for recreation. The basic premises of TCM is that the travel cost expenses & time that people incur to visit a site represent the "price" of access to the site.

[2]Consumer surplus (CS) is a measure of the economic welfare that a particular person or society gains from purchasing & then consuming a good or service. CS is the differnce between the total amount that consumers are willing to pay for a good or service(shown by the demand curve) & the total amount that they actually do pay (i.e. the market price).

The park provides tourists, both local and foreigners, an oppurtunity to appreciate the wonders of agriculture and nature's resources for educational and recreational purpose. The author estimated total annual net economic benefit provided by the park to the society based on total number of visitors in 2000 at RM 19 million per year. Becker et al (2005) estimated annual economic benefit of viewing threatened Eurasian griffon vulture (*Gyps fulvus*) at Gamla National Reserve, Israel which was assessed around US $ 1.1 to 1.2 million. This annual economic value was found approximately five times higher than the current revenue and 85 % of the visitors to this reserve came to view and appreciate vultures. Herath and Kennedy (2004) estimated recreational value of Mount Buffalo National Park, Australia using TCM and Contingent valuation method (CVM). The consumer surplus obtained from TCM was higher than that obtained through CVM. The authors concluded that present entry fee system did not capture true economic value of the park and it should be increased to enhance revenue. Blackwell and Asafu-Adjaye (1997) estimated recreational value of Noosa National Park, Australia using CVM. The researchers estimated recreational benefits of the park amounting to $ 5.24 per person per visit and total annual use benefits of $ 5.24 to $ 7.86 million. According to them, charging of fees to recover full costs (capital and operating) could not be justified on equity grounds and a policy of charging entry fee should be based on recovering at least part of costs of operation and maintenance of the park. Andualem and Oyekale (2012) found out potential use value of Addis Ababa Lions Zoological Park, Ethiopia as Birr 11, 767, 287 per annum (1 US $ = 20 Birr) by TCM. According to authors, the result of the study could be incorporated in the economic analysis for determining the viability of conserving wildlife of the park in long run. The estimated benefits obtained from the study could be transferred to similar parks for the purpose of policy or management decisions to affect target resources. Paul (2011) used TCM to estimate consumer surplus per trip per visitor day of Ngoe beach Kribi, Cameroon between Euro 9.86 to Euro 37.11 and suggested a possible access fee of Euro 2.00 to the beach on the basis of stated willingness to pay of visitors. Winkle (2013) estimated consumer surplus of Arusha National Park of Tanzania by using TCM around $ 13.28 to $ 37.88 per person per day spent in the park. One half of the overall tourists to the park were East African citizens, amounting to an annual recreational value potential of $ 0.9 to $ 2.7 million. Durojaiye and Ikpi (1988) used TCM to estimate annual recreational benefits of three urban zoological cum amusement parks in Nigeria and concluded urban residents of Ibadan and Lagos received annual benefits between $ 0.37 to 2.31 per trip. Annual economic benefit obtained from recreational activity in Margalla Hills National Park near Islamabad, Pakistan using TCM was obtained by

Himayatullah (2003). The study found this benefit quite high at US $ 0.4 million annually. Another study by Shammin (1999) used TCM to find people'e willingness to pay for services and attributes of Dhaka zoo in Bangladesh which was found at US $ 7.46 per visitor day. The study suggested that the optimum entrance fee to the zoo can be safely raised to 10 taka.

Methodology

In the present study, we used ZTCM to estimate the recreational value of the biological park, Itanagar. Visitors coming to the park were divided into five zones as given in Table 2.

Table 2: Zonal distribution of sampled visitors

Zone	Distance from park (Km)	Place of origin of visitors	Number of sample visitors
1	Up to 100	Itanagar, Naharlagun, Yupia, Nirjuli, Doimukh, Gohpur, N.Lakhimpur	67
2	101-300	Sagalee, Ziro, Bhalukpong, Likabali, Palin, Pasighat, Basar, B.Chariali, Balipara, Tezpur	32
3	301-600	Tawang, Bomdila, Seppa, Roing, Along, Daporijo, Ying Kiong, Mechuka, Guwahati, Tinsukia, Dibrugarh, Kohima	28
4	601-900	Tezu, Changlang, Khonsa, Miao, Namsai, Anini, Silchar, Karimganj	19
5	➢ 900	Indian states other than N E states	17
		Total number of sample visitors	163

Data collection and analysis

A questionnaire was prepared for the visitors of the Biological park to record the details regarding place of origin, mode of transport used, cost of travel and purpose of visit to the park. A sample of 163 tourists was adopted in the study for obtaining complete information about age, occupation, monthly income, suggestion for improvement of the park facilities from them. They were contacted 'in person' for the survey purpose after their park visit was over. All the willing respondents were included in the survey as some of them expressed their inability for filling up the questionnaire survey form due to time constriant. The data was taken during twenty eight (28) holidays/festivals falling during three month period of January to March 2015 as maximum number of tourists come during holidays. It was found that most of the visitors came either by own car (55 %) or motor bike (34 %). Very few came by buses or other means (11 %). Majority of the tourists (67 %) were between 25 to 45 years of age. Similarly, slightly more than two thirds of the tourists were found graduates

and above. This kind of trend was also observed in the study conducted at Mahatama Gandhi Marine National Park, Port Blair (Chaudhry and Tewari, 2016). This proves that educated people have more inclination in visiting National Parks/Sanctuaries/Biological Parks in a developing country like India. Majority of the tourists (82 %) indicated that their main aim of the visit was recreation, while 15 % mentioned both recreation and education were the objectives of their visit. Only 3 % of the tourists came exlusively for educational or reserach purpose. Round trip cost of travel was asked from the visitors and also verified/estimated taking average cost of petrol at Rs 70 per litre and average mileage of the vehicle used. Population of zones (comprising districts of states) was taken from census data (2011) of Government of India. Table 3 presents details about travel costs and corresponding visitation rates (vrate) for different zones. The analysis was done using statistical package SPSS 16 for Windows. Following detailed methodology given in Chaudhry and Tewari (2006 and 2008), observed number of visitors from each zone (Obsvis) were compiled on the spreadsheet of above software from the survey data. The proportion of visits per zone (Propvis) was estimated by dividing the number of visits in that zone by the total number of visitors. Actual number of visits (Actuvis) was assesed by multiplying respective zonal proportion of visits by number of visitors per day i.e. 178 (from Table 1 i.e. average annual tourists visiting park 65000/365)). Visitation rate (Vrate) for each zone i.e. actual number of visits per zone divided by zonal population was estimated (Table 3).

Table 3: Calculation of visitation rate for different zones

Zone	Population (P)	Travel cost (Rs)	Travel Cost (US $ equivalent)	Obsvis	Propvis	Actuvis (V)	Vrate (V/P) x 10^6
1	2142632	350	5.40	67	0.41	72.98	34.00
2	1840514	1,800	27.70	32	0.19	33.82	18.00
3	3911213	3,500	53.80	28	0.17	30.26	07.00
4	3629424	6,200	95.40	19	0.12	19.58	06.00
5	3218578	13,500	207.70	17	0.11	17.80	03.00

'Whole experience demand curve' was estimated using regression analysis with visitation rate as the dependent variable and travel cost as independent variable (Figure 1). Visitation rate was added as raw data and SPSS software selected an appropriate curve fit i.e. a non-linear curve fit. Various models were applied on the data and were tested for their predictive ability in compiling an unbiased estimate of the demand curve. The inverse model

(V/P=a+b/TC+ error) of the fitting was selected as the R^2 was found highest as 0.76 for the model.

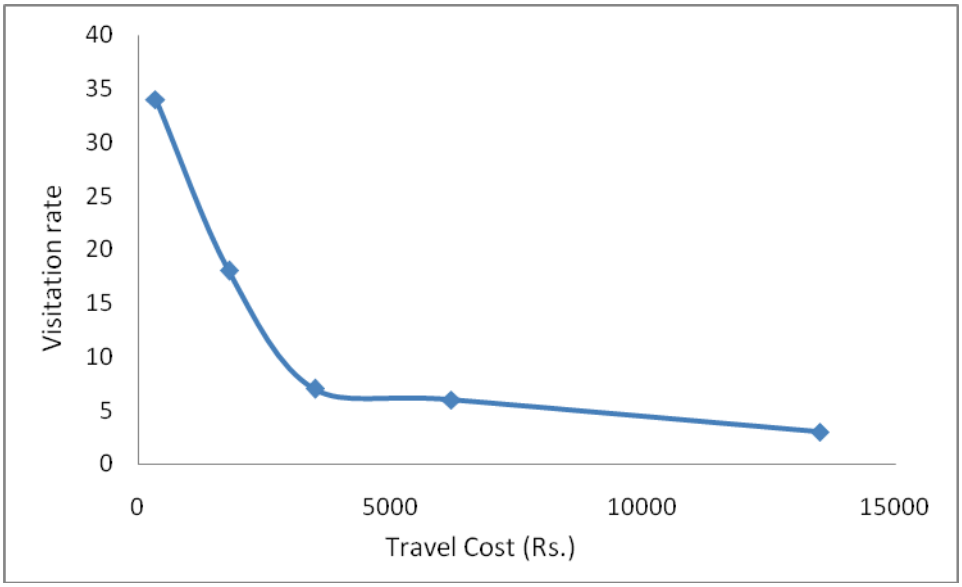

Figure 1: Whole experience demand curve

This 'whole experience demand curve' was used for creating a 'net recreational demand curve' by adding a hypothetical entrance fee (Rs 50 to Rs 2500) to travel costs and forecasting the resultant number of tourists shown in Table 4.

Table 4: Variation of visitors' population with increase in entry fee

Hypothetical entry fee (Rs)	US $ equivalent of hypothetical entry fee	Estimated number of visitors
50	0.77	141
100	1.54	128
250	3.85	105
500	7.70	78
1000	15.40	26
2000	30.77	14
2500	38.50	06

The resultant 'net recreational demand curve' between number of visitors and travel costs with added entry fee was plotted (Figure 2). The area under the curve gives an approximate consumer surplus per day enjoyed by a visitor coming to the park i.e. Rs 95000 (US $ 1462) for recreational or educational purpose or both. Dividing this figure by 178 i.e. average number of visitors per day, we get net benefit received by each visitor from recreational experience at the park i.e. Rs. 534 (US $ 8.20) consumer surplus per individual visit. Average number of visitors visiting park during last four years is around 65000 (Table 1). Multiplying this figure with Rs 534 (US $ 8.20), we get annual recreational value of the park, which comes around Rs 34.71 million (US $ 0.53 million per year). This figure is a conservative estimate of annual recreational value of the park because tourists coming for tourism purpose only were considered for the questionnaire survey in the park and not coming for multi-purpose visit to the Itanagar city. Secondly, boarding and lodging expenses of the tourists for the visit-day have been neglected and round travel costs only have been considered in the analysis. Thirdly, the international tourists also contribute towards recreational value of the site; have not been included in the study as their numbers were not sufficient to be included in statistical analysis involved.

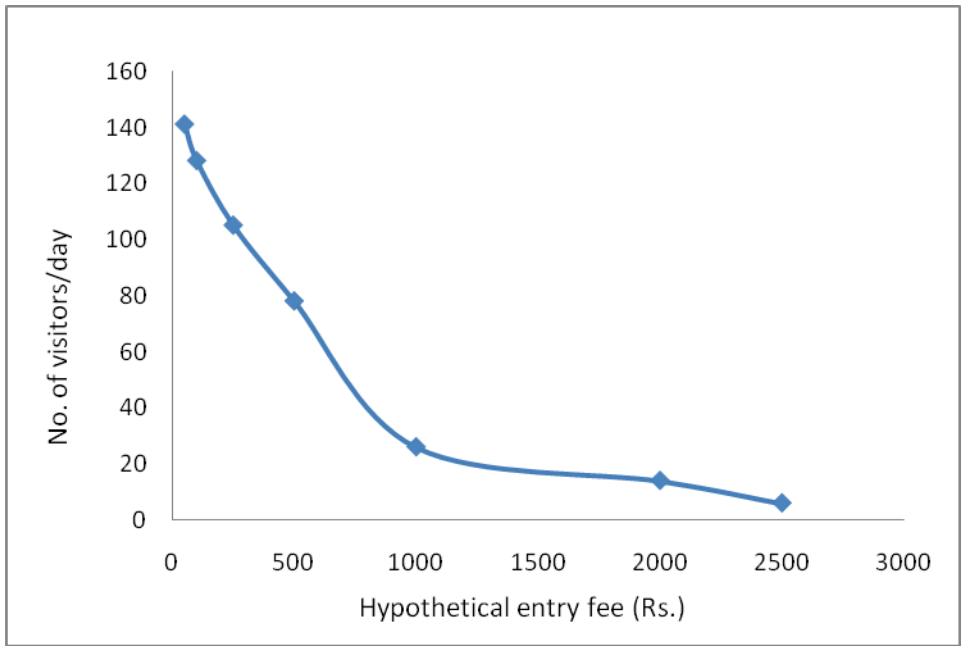

Figure 2: Net recreational demand curve

Discussion

Very little work has been done on valuation aspect of wildlife conservation sites in India. Some studies have been conducted on this aspect in National Parks/Tiger reserves located in different parts of country but as per available literature, no study has been conducted for estimating recreational value of a biological/zoological park of the country. A study on estimating tourism recreational value of Rock Garden, Chandigarh is available but the site does not fall under the category of a biological or zoological park/garden (Chaudhry and Tewari, 2008). The estimated annual recreational value of Biological Park Itanagar has been found higher than that of Corbett Tiger Reserve (Rs. 30 million or US $ 0.46 million, Badola et al, 2010) and Mahatama Gandhi Marine National Park, Port Blair (Rs. 25 million or US $ 0.38 million, Chaudhry and Tewari, 2005). It is almost comparable to Sunderbans Tiger Reserve (Rs. 37 million or US $ 0.57 million, Guha and Ghosh, 2009) but considerably lower to Kanha Tiger Reserve (Rs. 383.7 million or US $ 5.90 million, Verma and Mishra, 2010), Kaziranga Tiger Reserve (Rs. 773.45 million or US $ 11.90 million, Bharali and Mazumdar, 2012) and Periyar Tiger Reserve (Rs. 425.15 million or US $ 6.55 million, Manoharan et al, 1998). Most of the above studies have used TCM for assessing recreational benefit of the site from the point of view of domestic visitors. Above comparisons indicate the significance of Biological Park of Itanagar, India from the view point of local visitors. Annual revenue earned (Rs 23.93 lakh or US $ 36815 during 2014-15) at Biological Park, Itanagar does not indicate true value of the park. In fact, the actual recreational value of the park is more than 14 times of the annual revenue earned.

Verma et al (2015) quantified as many as 25 ecosystem services emanating from selected Tiger reserves of India. Important ecosystem services considered in the study included gene pool protection, carbon sequestration and storage, water provisioning and purification, soil conservation, nutrient cycling, pollination, waste assimilation and recreation besides providing timber, fuelwood and fodder. Monetary values of flow benefits from these Tiger reserves range from Rs. 8.30 billion (US $ 0.13 billion) to Rs 17.60 billion (US $ 0.27 billion) annually. In terms of unit area, this translates in to Rs 50,000 (US $ 769) to Rs 1, 90, 000 (US $ 2923) per ha per year whereas in present study of Biological Park, Itanagar, recreational value of the site alone accounts for Rs 1, 38, 840 per ha per year (Rs 34.71 million/250 ha) or US $ 2136 per ha per year (US $ 534000/250 ha).

During 2013-14 and 2014-15, an overall expenditure of Rs 36.50 million and Rs 37.81 million respectively was incurred over salary, wages and upkeep of Biological Park,

Itanagar. This average annual expenditure of Rs 37.15 million (US $ 0.57 million) during last two years is quite low considering annual recreational and other tangible and intangible benefits emanating out of this ecological asset. For example, value of standing timber alone is about Rs 125 million (US $ 1.92 million). Considering medium density forest cover (0.5) of the park and a conservative growing stock estimate of 25 cu m/ha, total timber stock for 250 ha of park comes around 6250 cu m. Considering an average timber price of Rs 20,000 per cu m, the value of standing timber stock comes around Rs 125 million (US $ 1.92 million). If value of other ecosystem services (flow benefits) mentioned above are taken in to account, these values may be hundred times than the annual expenditure and revenue figures of the park.

An average family of two adults and three children, coming by car to the park, has to pay Rs 70 as entry fee for five persons (Rs 20 each for adults and Rs 10 for children above 10 years age), Rs 500 for video camera and Rs 300 for car entry fee (overall Rs. 870/-or US $ 13.40) at present, whereas recreational benefit enjoyed by the family comes around Rs 2670 (Rs 534X5) or US $ 41 (US $ 8.2X5). For a couple coming on a bike with a still camera, has to pay Rs 40 as entry fee and Rs 100 for still camera (overall Rs 140 or US $ 2.15 only), whereas recreational benefit enjoyed by the couple is about Rs 1068 (US $ 16.50) for the visit. Above two cases, indicate that Department of Environment and Forests, Govt of Arunachal Pradesh, is providing a kind of environmental subsidy to the tourists visiting the park. According to above analysis, considerable scope is there for enhancing present entry charges at the park, but State Government's prime social responsibility is about creating environmental awareness among its citizens and not the revenue maximization from ecological assets like National Park, Sanctuaries and Biological parks. The present study is a small step in assessing a portion of the 'Total Economic Value' associated with a natural resource. The intrinsic value of the park in the form of provisioning, regulating, cultural and supporting ecosystem services is immense for the region and must be estimated by way of a detailed study in future.

Conclusion

Biological Park, Itanagar is one of the significant tourist spots in the capital city of Arunachal Pradesh of India. More than 70,000 domestic tourists visited the park during the year 2014-15 and about Rs 2.40 million (U S $ 36923) revenue was earned. Annual recreational value of the site has been estimated around Rs 34.71 million (US $ 0.53 million) using travel cost method, which is higher than Jim Corbett National Park/Tiger Reserve and

Mahatama Gandhi Marine National Park, Port Blair, A & N Islands. This fact indicates about the importance and significant contribution of the site in educating and providing recreation to the people of the North-East Indian region. Department of Environment and Forests, Government of Arunachal Pradesh is charging a very nominal entry fee for the individuals and vehicles at present in the park. With a consumer surplus of Rs 534 (US $ 8.20) per visit, there is a considerable scope of enhancing the entry fee, but the department is inclined towards a kind of environmental subsidy to the local citizens, recognizing the need of spreading the message of environmental and wildlife conservation through this ecological asset in the form of Biological Park, Itanagar. The Central Government must provide adequate financial resources for further improvement of the park so that coming generations can have a glimpse of precious wildlife and biodiversity of the region. The recreational value of the park assessed by TCM in the present study is certainly on a lower side due to certain factors not included in analysis due to time and other constraints e.g. inclusion of opportunity cost of travel and site visit time of the tourists, multi-purpose and multisite journeys, and choice of functional form used to estimate demand curve. These aspects can also be stated as limitations of the travel cost method. A detailed and more comprehensive study in future using various methods of environmental economics may yield more plausible results of different components of 'total economic value' of the park.

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