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AN ASSESSMENT OF SCENIC VALUE OF SRI LANKAN ELEPHANTS: THE CASE OF PINNAWELA ORPHANAGE

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Abstract: Elephants are a unique biological and cultural resource for Sri Lanka. Conservation of Sri Lankan elephants is a felt need since the elephant population has declined to a very low level. However, elephant conservation has become a resource use conflict as it competes for scarce natural and public resources. An extended benefit cost analysis on elephant conservation is necessary to determine the efficient allocation of resources for elephant conservation. This study generates part of the economic information required for such an analysis. Using a travel cost model this study estimates the scenic value of elephants at Pinnawela orphanage. Results show that local visitors derive Rs. 12.2 million worth scenic benefits per annum from the Pinnawela orphanage. A preliminary assessment on the scenic value by foreign visitors indicates that their recreational benefits from viewing elephants is much higher. Therefore, policies should be designed to capture part of the scenic benefits of foreign visitors by increasing producer surpluses that accrue locally.

1. Introduction

There are about eighty six mammal species in Sri Lanka. Of these, elephants are a unique group of animals which have been receiving human attention since the beginning of civilization (Fernando 1990). Elephants were used in wars, were traded, and were used in various cultural activities. Thus, there has been a strong cultural link between elephants and Sri Lankan society throughout history (Fernando 1990). Recently, considerable attention has been focussed on the reduction of the elephant population in the country due to the rapid deforestation that took place since the beginning of the century. At the beginning of the century, Sri Lanka had an estimated 12,000 elephants and they were distributed in both dry and wet zones. According to NARESA (1990), there are about 3000 elephants in the country and they are restricted to the dry zone. It is believed that selective poaching for trophies and ivory has reduced the genetic trait for tusk formation and

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only 5% of elephants possess tusks at present. That is considered to be very low compared to Asian standards (NARESA 1990). A recent census estimates the elephant population to be 5,000 animals (personal communication).

Conservation of elephants as a valuable biological and cultural resource in the country seems to be accepted by the majority. The problem, however, is that the resources already allocated or that would be allocated in the future for elephant conservation are limited. For habitat, elephants have to compete with human use of land and other resources. Sri Lanka is a developing country with acute socio-economic problems such as poverty, unemployment and malnutrition. Therefore, policy makers must strike a balance between conservation of resources and associated foregone development opportunities. Environmental lobbies, in general, tend to overlook the cost of environmental preservation. Especially, overlooking the costs of environmental preservation on the rural poor has been significant (Wells 1992, Syamsundar and Kramer 1996, Gunatilake 1994, Gunatilake *et al.* 1993, Panayotou 1994). Thus, despite the existing consensus on the need to preserve elephants the amount of public funding that should be allocated for elephant preservation remains as an unresolved issue.

When there are costs and benefits attached to preserving biological resources, weighing these costs against the benefits is required to assess the overall impact of the activity on the society. As in many other natural resources preservation issues, quantification of the benefits of preservation of elephants is not easy, although, many feel some benefits will accrue by this. Therefore, it is a timely need to identify and value all the benefits of preserving elephants. Value can be defined in various ways depending on the purpose it is being used. Therefore, in valuation of benefits, a set of objectives must be defined to guide this process. In economic analysis, it is customary to use social welfare as the guideline of evaluating alternative uses of resources (Freeman 1994). The ultimate objective of any policy, programme, or project is to maximize the social welfare as defined in economics. A conservation programme should not be an exception in this regard.

In searching solutions to conflicting resource allocation issues, policy makers should adopt an objective framework to make sure that the society as a whole gains benefits in excess of costs. Extended benefit cost analysis in economics provides such a holistic framework. However, all the data required for a benefit cost analysis of preservation of elephants is not available at present. Benefits of preservation of species is both a theoretically and empirically challenging task. Environmental lobbies tend to assign infinite value for species in the absence of accurate information on benefits, when they advocate conservation. Although it is difficult to assign values for everything, especially a value for environmental resources, valuation generally, narrows down the issues involved in resource allocation to a manageable level.

Information required to make decisions on resource allocation, particularly in case of conservation, include both ecological and economic aspects. Very often, all the scientific information required for such an evaluation is not available. This lack of information is particularly true for developing countries (Hufschmidt *et al*, 1983). Generation of the necessary information may also be very costly. Moreover, scientific relationships of some aspects of interaction among species and their relation with the ecosystems are yet to be understood. For example, it is very difficult to state the actual land requirement for an elephant for continuous existence and reproduction in a given climatic zone, based on the current scientific knowledge. Despite such difficulties inherent in valuation, researchers should put more efforts into generating necessary information on cost and benefit of conservation in order to facilitate efficient allocation of natural resources. This study generates part of the information required to carry out an extended benefit cost analysis of preservation of elephants in Sri Lanka. This is a first step of a series of studies necessary to generate all the information required for economic evaluation of preservation of elephants in Sri Lanka. The objective of this study is to estimate the scenic value of the elephant at the captive state at the Pinnawela Orphanage using travel cost method.

Theoretical Framework

This section discusses the theory of economic value and presents a utility maximization model to derive the recreational demand function on which the travel cost method is based.

Economic Value

A fundamental question that arises, when focusing on the conservation of elephants, is, what does society gain (benefits) and what does the society forego (cost) by this act. Gains and foregone opportunities, however, should not be defined narrowly as previously done in the conventional economics because, narrowly defined costs and benefits have given wrong signals to policy makers in the past. One way of avoiding this problem is to address the value of the resource to be conserved, in broader perspective. Value, in general, is described as the esteem in which an object is held (Encyclopedia Americana 1958). In economic perspective, value is attributed to desirability and scarcity. There can be different types of values such as economic, ethical, aesthetic, logical or theoretical, and religious (Winppeny 1991). The focus of this study is on economic value.

In a well functioning market economy, prices represent both preferences and relative scarcity. Competitive market prices have useful features in public decision making ((Randall 1981, Brown 1984). Firstly, goods with market prices put them on an approximately comparable basis. Secondly, formation of prices is a social phenomenon that involves exchanges among many individuals in a society. Thirdly, they incorporate scarcity into the value since price formation involves the interaction of supply, which is constrained by real world scarcity and demand. Finally, market prices give the relative value of small changes in supply or demand. Thus, the market price represents the economic value of the commodity, provided that the market functions properly. Prices, according to neo-classical economic theory, automatically allocate resources among different sectors in an efficient manner. However, all commodities do not have market prices. Allocation of resources become a challenging task, when commodities do not have prices. Non-market valuation techniques can be used to value such resources.

The total economic value is a concept that was developed recently, to encompass all the different costs and benefits of allocating a resource to a particular use. This concept broadens the economic value concept incorporating environmental and intergenerational equity concerns. Total economic value concept is a response from neo-classical economics to recent critiques it faced for not representing environmental costs and benefits adequately (Van Den Berg and Straaten 1994). Thus, total economic value offers a holistic perspective to value a resource and recognizes the broader costs and benefits attached to a particular usage of that resource.

The total economic value is sub-divided into two groups, namely, use value and non-use value. Use value can be further sub-divided into two major groups namely, actual use value and option value (Pearce 1993). Actual use value may be direct or indirect. Use of ivory, trophies, draft power and scenic value of elephants come under direct use value. Indirect use value refers to environmental services provided by biological resources such as maintaining genetic diversity, maintaining the natural balance and life support system. Option value refers to the willingness to pay for an environmental resource with the hope that an individual will use it at a later date. Non-use value has two major groups namely, bequest value and existence value. Bequest value involves the interest of individuals to save a natural resource for future generations. Individuals who are willing to pay for preserving the resource will not want to use it. Thus, bequest value also has some connotation of use although the present generation which saves the resources does not use them. Existence value is a pure non-use value since it refers to the intrinsic value of a resource or the environment in which it exists (Lesser *et al.* 1997). Our main emphasis in this case is on estimating a part of the direct use value i.e. scenic value.

A Travel Cost Model for Recreational Demand

Although there is a nominal fee at the gate of a zoological garden, viewing elephants is un-priced because marginal monetary cost of viewing elephants is zero. In the absence of a market price, commonly used in valuation, an indirect way can be used to estimate the demand function for viewing elephants (Dixon and Hufschmidt 1986, Hufschmidt *et al.* 1983). Although the entrance fee is fixed (or no fee) demand for the good is not infinite because there are costs involved in getting to and from the site i.e travel cost and opportunity cost of time. Travel and time costs can be used to infer the demand for recreational sites. This approach is known as travel cost method. Hotelling (1949) and Clawson (1959) originally proposed the travel cost method and today it is a widely accepted tool in environmental economics (Freeman 1994). Brown and Henry (1989) have used this method to estimate scenic value of Kenyan elephants. In Sri Lanka, Abeygunawardena and Kodituwakku (1992), Abeygunawardena (1993) have used this method to estimate recreational value of Peradeniya Botanic Gardens and Sinharaja forest, respectively.

The Travel cost model is based on the recognition that the cost of traveling to a site is one important component of the full cost of a visit and that, for any given site, there will be wide variation in travel costs across any sample of visitors to that site. To formalize this concept, following McConnell (1992), let us consider an individual's choice of the number of visits to a recreational site. Assume that the individual's utility depends on the total number of visits to a recreation site, the quality of the site, and a bundle of other goods. His utility function is represented by:

$$u = u(X,r,q) \qquad \ldots\ldots (1)$$

where

u = utility
X = bundle of other commodities
r = number of visits to the recreational site
q = quality of the recreational site

The consumer faces the following budget constraint:

$$M + pw.t_w = X + c.r \qquad \text{...... (2)}$$

where

M	=	exogenous income
pw	=	wage rate
t_w	=	hours of work
c	=	monetary cost of a trip

In addition to the above budget constraint, the consumer faces the following time constraint:

$$t^* = t_w + (t_1 + t_2)r \qquad \text{....... (3)}$$

where

t^*	=	total discretionary time
t_1	=	round trip travel time
t_2	=	time spent at site

Substituting the term from (3) into (2) we obtain a time budget constraint:

$$M + pw.t^* = X + r[c + pw(t_1 + t_2)] \qquad \text{........ (4)}$$

Equation (4) implies that the total income of the individual is spent in consuming a bundle of other commodities and recreation at the site. The total income has two components, namely, the exogenous income and the potential income earned by allocating all the available time for work. Exogenous income is any income other than wage-income in this case. Consumer's expenditure includes cost of the other commodities and cost of recreation. Note that the bundle of other commodities is assumed to be the numeraire in this model. The price of recreation, pr, includes the monetary cost of travel to the site, the time cost of travel to the site, and the cost of time spent at the site, .i.e $pr = c + pw(t_1+t_2)$. The monetary cost of travel has two components; the admission fee and the monetary cost of travel. The admission fee is represented by f and the monetary cost of travel is given by $p_d.d$ where p_d is the per km cost of travel and d is the distance traveled. Thus, the utility maximization problem of the consumer can be represented as:

$$\text{Max: } u(X,r,q) \qquad \ldots\ldots (5)$$

$$\text{St: } M + pw.\, t^{*} = X + r[f + p_d.d + pw(t_1 + t_2]$$

The Lagrangian function of the maximization problem is:

$$L = u(X, r, q) + \lambda(M + p_w.t^{*} - [X + r\{f + pd.d + pw(t_1 + t_2)\}]) \qquad \ldots\ldots (6)$$

The first order necessary conditions of the utility maximization problem are:

$$\frac{\partial u}{\partial x} = \lambda \qquad \ldots\ldots (7.1)$$

$$\frac{\partial u}{\partial u} = \lambda\ \{f + pd.\ d + pw\ (t_1 + t_2)\} \qquad \ldots\ldots (7.2)$$

$$M + pw.t^{*} = X + r\{f + p_d.d + pw\ (t_1 + t_2)\} \qquad \ldots\ldots (7.3)$$

where

λ = marginal utility of money income.

Equation (7.1) implies that the consumer purchases the other commodities up to a point where his marginal utility is equal to the marginal utility of money income times the price of other commodities (unity). Similarly, equation (7.2) shows that the consumer chooses the number of visits to the recreation site at the point where marginal utility of the visit equals the full price of recreation times the marginal utility of money income. As shown earlier, the full price of recreation includes the fee at the gate, monetary cost of travel, round trip time cost and the time cost at the site. The equation (7.3) equates the consumer's income to his expenditure. Solution to the above equations provides demand function for number of visits to the recreation site. The demand function for the number of visits can be represented as:

$$r = r(p_r(f, p_d, d, pw, t_1, t_2), M, q) \qquad \text{....... (8)}$$

Economic valuation of a recreational site involves the estimation of the demand for recreation (equation 8) and calculation of the associated consumer surplus, i. e the area under the demand curve. If a more precise definition of welfare is adopted, the value of a recreation site should be measured as the area under the compensated demand curve. Since the compensated demand curve cannot be observed, the observable Marshallian demand curve is used to estimate the value. Willig (1976) provides a justification for the use of Marshallian demand curve instead of the compensated demand curve. Since the model is built for an individual consumer, estimation requires time series data on the number of visits by individuals. Generating such data is very difficult. Instead, one can use cross sectional data and aggregate the consumer surplus assuming visitors in a region have the same characteristics. Thus, in a cross sectional study visitation rate from a region (the number of visitors from a region divided by total population) can be used as proxy for the quantity demanded for recreation.

Those who live close to a recreational site, such as an elephant orphanage, would be expected to make more visits to the site since implicit price measured in terms of travel and time cost is lower for them than for visitors living far away from the site (Dixon and Hufschmidt 1986). Therefore, the visitation rate from a region should have a negative relation to the travel cost according to the law of demand. Consumer surplus is expected to be lower for the visitors from distant places than for the visitors from nearby places. Thus, a demand function for the un-priced commodity can be estimated taking visitation rate and the travel cost. The estimated demand function can be used to calculate the total consumer surplus, which is the welfare derived from the recreational site. This value is formally represented as:

$$V = \int_{p_{ro}}^{p_{m}} r(p_r(f, p_d, d, p_w, t_1, t_2), M, q) \quad \text{........ (9)}$$

where

p_{ro} = is the lowest total price of recreation
p_{m} = is the highest total price of recreation

Methods and Data

Data required for this study were collected using a structured questionnaire and a total count of visitors at the Pinnawela Elephant orphanage. The zoological garden at Dehiwala was not selected since it contains many species of animals. Visitors derive multiple scenic benefits from such a zoological garden whereas scenic value gained from Pinnawela orphanage can be directly attributed to elephants. The orphanage is located about six miles from the Kegalle city. There are about 60 elephants in the Orphanage. From July 1992 to June 1993 the orphanage was visited by 99,103 foreign visitors and 82,571 local visitors. Based on the number of visitors and monthly income of the orphanage during the above mentioned period, the orphanage has earned Rs 9,367,664.00. Total cost of maintenance is estimated to be Rs 4,107,880.00. According to the data the orphanage is operating at a considerable profit.

Fifty randomly selected visitors were interviewed at the orphanage. Travel cost to and from the orphanage, opportunity cost of time and other related socio economic variables were collected through the questionnaire. The survey was conducted during the month of August 1993. In order to estimate visitation rate, a total count of visitors was made. In this count, data on the number of visitors and their zones of origin were collected.

Average travel cost and time cost for different zones were calculated using the data from the questionnaire. Only fourteen districts were considered as zones. Other districts were excluded since the number of visitors from these districts was very low or zero during the period of the study. Visitation rates were calculated using the total count for each district. An OLS regression model was fitted for the visitation rate. Independent variables considered in this model were: total travel cost (travel and time cost), an index to represent the average zonal education and the percentage of urban population in the zone. Average zonal educational indices were developed using zonal literacy rate and teacher/student ratios. Teacher/student ratio was multiplied by 1000 to make it comparable to the percentage literacy rate. Averages of these two values were taken as the educational indices for different zones. In the absence of data on zonal incomes, percentage urban population was used in the analysis. Zonal demand curves for scenic value of elephants were derived from the estimated regression model following the Dixon and Hufschmidt (1986) method. Estimated zonal demand curves were used to calculate the consumer surplus for each zone. The scenic value of elephants at Pinnawela orphanage was estimated by adding the zonal consumer surpluses.

Results and Discussion

The total number of visitors and visitation rates for each zone are presented in table 1. The highest number of visitors was recorded from the Colombo District while the lowest is from Polonnaruwa. The highest visitation rate is also recorded from the Colombo District. Kegalle and Kurunegala Districts which are close to the orphanage show the next highest visitation rates. High visitation rates from Kegalle and Kurunegala are due to the lower travel and time costs. Higher visitation rate from Colombo may be explained by the higher zonal income of Colombo.

Table 1: Number of visitors, population, and visitation rates.

District	Visitor count	Population	Visitation rate
Kurunegala	11971	1212000	0.009877
Colombo	37136	1911000	0.019433
Anuradhapura	1490	693000	0.002150
Kegalle	10509	739000	0.014221
Kandy	5408	1231000	0.004393
Ratnapura	3116	911000	0.003420
Nuwara Eliya	236	532000	0.000444
Matale	1032	410000	0.002516
Gampaha	10275	1506000	0.006823
Kalutara	1146	925000	0.001239
Puttalam	279	580000	0.000481
Matara	128	755000	0.000170
Galle	458	755000	0.000607
Polonnaruwa	86	310000	0.000277

Average zonal travel cost, time cost and the educational indices are presented in table 2. One major problem encountered in estimating travel and time cost is the multipurpose nature of the visits. Some visitors make multipurpose visits according to the survey results. Therefore, the actual travel and time cost that can be attributed to the orphanage is the cost from previous recreational site and cost at the orphanage. Given the difficulties encountered in allocating travel cost to different recreational sites visited by multiple sites visitors, only the cost from the origin to the site was used in this study. This may overestimate the travel cost if the visitors stop at other sites before reaching the orphanage. However, if visit is a single site visit, it will underestimate the travel cost since it ignores the cost of traveling back home. An implied assumption in this simple method of calculating cost is that these two biases will cancel each other. Different modes of transport are also used to come to the orphanage. Therefore, an average per km travel cost was calculated using the data from the questionnaire. This value was then multiplied by the relevant distance traveled to estimate the travel cost. Time cost was calculated using hourly wage rate and the time (travel time and time spent at orphanage) attributed to the visit to the orphanage.

Table 2: Travel cost and educational indices for different zones.

District	Travel cost (Rs.)	Time cost (Rs.)	Total cost (Rs.)	Educational index
Kurunegala	28.38	54.00	82.38	62.6
Colombo	79.12	92.00	171.12	65.1
Anuradhapura	139.32	134.00	273.32	57.1
Kegalle	5.16	52.00	57.16	63.1
Kandy	16.51	88.00	104.51	61.0
Ratnapura	99.76	118.00	217.76	55.7
Nuwara Eliya	86.86	112.00	198.86	48.8
Matale	43.00	87.00	130.00	58.5
Gampaha	54.18	82.00	136.18	64.4
Kalutara	111.80	127.00	238.80	62.3
Puttalam	189.20	102.00	291.20	59.3
Matara	217.58	138.00	355.58	61.8
Galle	178.20	124.00	302.20	62.1
Polonnaruwa	140.34	142.00	282.34	58.4

The model was initially estimated using travel cost, the education index and percentage urban population. However, the educational index and percentage urban population were found to be highly correlated. Therefore, the urban population variable was dropped from the model to avoid multicollinearity problem. The final model fitted for visitation rate is presented below. Values given within parenthesis are standard errors of the coefficients.

$$V_r = -0.02773 \; -0.00003\, T_c + 0.000647Ed \qquad \ldots\ldots\ldots (10)$$
$$(0.00445) \; (0.000014) \; (0.000294)$$

$R^2 = 0.52$

where

V_r = Visitation rate,
T_c = Total Travel Cost,
Ed= Educational Index,

Both dependent variables show the expected signs and they are significant at $\alpha = 0.05$ level. Thus the empirical evidence is compatible with the postulated economic theory. The regression model was free from multicollinearity and heteroscedasticity problems. As shown by the R^2, about 52% of the variation in the visitation rate is explained by the regression model. In a cross sectional study this is an acceptable level of goodness of fit. Therefore, the regression results qualify to be used for further inferences about the scenic value of the elephant. Following Dixon and Hufschmidt (1986) method, equation (9) was multiplied by the total population of the zone after substituting average T_c and Ed values to the equation to derive zonal demand functions. These demand functions were used to calculate the consumer surplus for each zone. Table 3 presents the zonal demand curve for scenic value of elephants at the Pinnawela Orphanage. The total scenic value of elephants was calculated by adding the zonal consumer surpluses.

Table 3: Zonal demand curves and consumer surpluses.

District	Intercept	Slope	Consumer surplus (Rs./year)
Kurunegala	425.74	-0.0481	2055181.3
Colombo	479.65	-0.0174	5415648.9
Anuradhapura	307.12	-0.0481	56471.0
Kegalle	436.54	-0.0451	1993561.0
Kandy	391.23	-0.0270	775434.2
Ratnapura	276.93	-0.0366	92186.9
Nuwara Eliya	128.12	-0.0626	8260.0
Matale	337.26	-0.0810	106842.5
Gampaha	464.56	-0.0221	1554203.1
Kalutara	383.30	-0.0360	50925.7
Puttalam	354.57	-0.0575	17705.9
Matara	406.72	-0.0441	3298.5
Galle	414.95	-0.0362	63027.3
Polonnaruwa	335.16	-0.1075	6657.3
Total			12,200,000.0

The results show that the highest scenic value of elephants was derived by visitors from Colombo district. Kegalle and Kurunegala districts derive the next highest scenic value followed by Gampaha district. Matara, Polonnaruwa, and Nuwara Eliya districts derive the lowest scenic values. The total scenic value of elephants at the Pinnawela orphanage is estimated to be Rs. 12.2

million per year. It should be noted here that this figure represents only the scenic value derived by local visitors excluding the school children. The scenic value derived by school children was not estimated due to theoretical problems involved. (See Gum and Martin (1975) for details of the problems involved in valuing recreational benefits by school children.)

The scenic value estimated above also excludes the scenic value of elephants by foreigners. During the period from June 1992 to May 1993, 93,400 foreigners visited the orphanage. The foreign component of the scenic value is very important since many visits are made by foreigners. In this study an attempt was made to value the foreign component too. This attempt failed due to lack of cooperation by foreign visitors. Foreigners spend a short period of time at the orphanage (about one hour) and, understandably, during this time they prefer to view elephants rather than answer our questions. Therefore, only a preliminary assessment of scenic value of elephants by foreigners was made using secondary data. A few questions were asked from foreigners who were cooperative to supplement the secondary data. The zones considered in this assessment include North America, Europe, Australia and New Zealand, East and South East Asia, and India. Data on number of visitors from each zone was obtained from the Tourist Board of Sri Lanka. Average Gross Domestic Product (GDP) per capita for the zones was used to represent the income. The same method used for local visitors was applied to estimate the recreational benefits accrued by foreigners. One problem encountered in estimating the foreign scenic value was that the estimated value is for total recreation value in Sri Lanka rather than scenic value of elephants. Following the Brown and Henry (1989) method of attributing total consumer surplus to various aspects of tourism using contingency valuation method, the scenic value of Sri Lankan elephants by foreigners was estimated.

Foreigners' total scenic value of elephants is estimated to be Rs. 2,364.9 million per year. This figure includes the scenic value of elephants at parks too. What portion of this value can be attributed to the orphanage is difficult to decide. Therefore, direct comparison of the foreign and local scenic value is not logical. However, it is clear that the foreign component of the scenic value is much higher than that of local (Rs.12.2 million). This difference is partly due to the higher scarcity value of the elephants for foreign viewers. Differences in currency value also contribute to the large difference of scenic value of elephants by locals and foreigners. Although the foreign scenic value is of preliminary nature, it indicates that foreigners benefited much more than locals by conservation of natural resources. This result partly explains the interest of foreign agencies in the conservation of natural resources in developing countries. Since such benefits of conservation flow out of the nation, policies should be directed to capture part of those benefits so that the costs borne by local people due to conservation can be fully compensated. Panayotou (1994) provides justification for such policies for the general case of biodiversity conservation. There are some benefits from foreign visitors. Such benefits derived from foreign visitors accrue in the form of producer surplus in providing accommodation, food, ground transport and fees charged at recreational sites. These benefits were however, not estimated in this study.

Summary and Conclusions

Elephants are a unique biological and cultural resource for Sri Lanka. Utilization of much of the dry-zone lands for agriculture and human settlements has reduced the elephant population and restricted their movements. Preservation of elephants, therefore, is a felt need. However, preservation of this unique resource has created a controversy as elephants compete for land and other resources. On the one hand, people who live close to wildlife sanctuaries bear the cost of preservation of elephants in terms of loss of lives, crop damages, etc. On the other hand elephants are killed on many occasions by rural people. Thus, despite the consensus of the majority to preserve elephants, a resource use conflict has evolved. Economic analyses generate valuable information in resolving such resource use conflicts. A complete set of economic information necessary to address the issue includes valuation of many costs and benefits involved. This study estimates value of scenic benefit of elephants at captive state which may be the most significant user value of elephants.

Results show that the local people derive Rs. 12.2 million worth benefits from viewing elephants at Pinnawela orphanage. This estimate together with other economic and ecological information can be used to examine suggested interventions and policies to resolve conflicts involved in elephant conservation in Sri Lanka. In addition, the estimated scenic value can be used to justify the public expenditure on maintaining an elephant orphanage. The attempt to estimate the scenic value of elephants by foreigners was not a success. A preliminary estimate of scenic value of elephants using secondary data shows that the foreign component of scenic value may be much higher than the local value. Discussions with some foreigners indicate that they would like to spend more time at the orphanage. However, the present facilities at the orphanage are not adequate to keep the visitors longer. If hotels and restaurant are built at the orphanage with facilities to view elephants, foreigners may spend more time and a part of the recreational benefits accruing to foreigners can be captured in terms of producer surplus.

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