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Rural and urban attitudes to the conservation of Asian elephants in Sri Lanka: empirical evidence

Abstract

There has been little study of economic and general attitudes towards the conservation of the Asian elephant. This paper reports and analyses results from surveys conducted in Sri Lanka of attitudes of urban dwellers and farmers towards nature conservation in general and the elephant conservation in particular. The analyses are based on urban and a rural sample. Contingent valuation techniques are used as survey instruments. Multivariate logit regression analysis is used to analyze the respondents' attitudes towards conservation of elephants. It is found that, although some variations occurred between the samples, the majority of the respondents (both rural and urban) have positive attitudes towards nature conservation in general. However, marked differences in attitudes toward elephant conservation are evident between these two samples: the majority of urban respondents were in favour of elephant conservation; rural respondents expressed a mixture of positive and negative attitudes. Overall, considerable unrecorded and as yet unutilised economic support for conservation of wild elephants exists in Sri Lanka.

KEYWORDS: Asian elephant, Conservation attitudes, Contingent valuation, Elephant conservation, *Elephas maximus*, Sri Lanka.

Rural and urban attitudes to the conservation of Asian elephants in Sri Lanka: empirical evidence

1. Introduction

Many wild animal species are perceived as having opposing attributes because from the point of some individuals in society they are assets but from the point of view of others in the same society they are pests (Tisdell and Xiang, 1998). The Asian elephant, *Elephas maximus*, in Sri Lanka is a classic example. While this elephant is regarded as a valued resource either for its use or non-use economic value by a wide variety of people, many local farmers in the elephant's range regard it as an agricultural pest which interferes with their farming practices, crop production and social well being. The dual character of the elephant as both an agricultural pest and a valuable economic asset reflects a difficulty in classifying it as a pest or as a resource. A number of authors have raised this issue in the context of several species of wildlife, but there has been minimal systematic discussion of it in relation to the Asian elephant backed up by empirical research. This article helps to fill this gap.

Tisdell (1979, 1982) poses the above issue for two important species of wildlife in Australia, kangaroos and feral pigs. These two species cause significant damage to crop production systems in Australian rangeland as agricultural pests and also generate benefits (commercial or otherwise) as valued resources. More recently, Zivin, *et al*. (2000) developed a bio-economic model to examine the status of feral pigs in the Californian rangeland. In this analysis, it is argued that the pest status of feral pigs could be transformed into that of a valuable resource with the replacement of 'pest control efforts' by 'resource management strategies'. Thus, the nature of any given wild animal – whether it is considered a "pest" or a "resource" - depends on one's

perspective, on economic opportunities, and on the regulatory environment in which the species exists. Hill (1998) describes an assessment of peoples' attitudes, particularly towards large animals, as an important element in formulating appropriate policies for the conservation of such wildlife.

Infield (1988) explains how the publication of the IUCN's *World Conservation Strategy* of 1980 has influenced present day conservation thinking. He argues that prior to this publication, wildlife conservation thinking was largely based on 'protectionist' policies, which discouraged every form of use of wildlife. However, it has now become common practice to include local people and their aspirations along with the interests of other stakeholder groups into the natural resource planning and management process (Borrower*, et al.*1999). Fiallo and Jacobson (1995) believe that rural communities' attitudes towards nature conservation should be analysed as a prior condition in conservation planing. These authors also believe that information gathered from such analysis can be useful in developing approaches to avoid unnecessary conflict, which too often exists between conservationists and local people living around protected areas. Streever *et al*. (1998) examine the general significance of public attitudes in a case study of wetland conservation in New South Wales, Australia. This study demonstrated that knowledge of public attitudes may be useful in developing public awareness programs, particularly when the general public is not aware of the current status and management problems in natural resources conservation.

Hart and O′Connell (2000) argue that all major managerial problems in elephant conservation and mitigation of human-elephant conflict in Asia are greatly influenced by the human component. Sri Lanka's situation is not exceptional. These authors believe that with the increase in human population in Asia, people's attitudes towards

the conservation of natural resources in general and elephant conservation in particular will become increasingly hostile as the demand for new land for human use increases. Further loss of habitat, vital for the conservation of many wildlife species, and increased fragmentation of habitat can be expected. Significant fragmentation and loss of the natural habitats of the elephant has already occurred. For instance, in Sri Lanka, the elephant range has reduced by 50 - 60% over the last hundred years (De Silva, 1998). As a result, the Asian elephant is in growing conflict with its human neighbours in its range. Therefore, study and analysis of people's attitudes towards elephant conservation is imperative.

Stevens *et al.* (1991) used contingent valuation techniques (CVT) to assess public attitudes towards the existence value of the four wildlife species reintroduced into the New England forests by the U. S. Department of Agriculture in the late 1980s. The works of Loomis and White (1996) provide a useful insight into the use of CVT in the evaluation of people's attitudes towards rare and endangered species**.** White *et al.* (2001) use CVT to quantify public preferences towards the UK Biodiversity Action Plans for four different British mammal species. Brouwer *et al.* (1999) examine the use of CVT as a supplementary input in the use of traditional cost-benefit analysis in the evaluation of public attitudes towards environmental conservation. The authors believe that CVT provides more flexibility than traditional economic techniques by allowing respondents to express their feelings, opinions, attitudes, beliefs, norms and values individually towards a given conservation concern. Pate and Loomis (1997) apply and examine the limitations of the CVT in a case study of wetlands and salmon conservation in California.

This paper explores the attitudes of Sri Lankans towards nature conservation in general and towards conservation of elephants in particular. The analysis presented in this paper is based on information gathered from two sample surveys, one urban and one rural, conducted in Sri Lanka. Data were collected by means of structured questionnaires, informal interviews and discussions. CVT was used as the survey instrument. The urban survey involved a sample of 300 residents chosen from three selected housing schemes in Colombo, the capital of Sri Lanka. The other survey was of a sample of 300 farmers chosen from six selected villages in the Northwestern province in Sri Lanka.

This article proceeds by first providing some background on human-elephant conflict in Sri Lanka. Then the dichotomous nature of the elephants as a valued resource and a pest is discussed, some note are given on possible misperceptions by farmers of its status, and the Kaldor-Hicks approach is introduced as a way of allowing for the negative and positive attributes of the species. This approach requires summation of the economic benefits and Determination of such a function requires that the estimation of the economic values that different stakeholders place on wild elephants by estimated. Consequently, a sample of urban dwellers and farmers in Sri Lanka was drawn to provide information on their valuations and attitudes towards the conservation of elephants. The nature of the sample surveys undertaken are reported and the attitudes of responding urban dwellers and farmers are outlined. Influences on these responses are then analysed using logit analysis. Contingent valuation responses then follow and influences on these are also analysed by means of logit analysis. Results are reported separately for the urban and rural samples and compared, and possible policy implications are outlined.

2. Some Background about Human-Elephant Conflict in Sri Lanka

Human-elephant conflict (HEC) occurs across the entire elephant range in Sri Lanka (De Silva, 1998, Santiapillai, 1998). The fragmentation and loss of the natural habitat of elephants is considered to be the main cause for HEC in Sri Lanka (Weerakoon, 1999). Desai, (1998) examines the cause for the fragmentation and loss of natural habitat of elephants. De Silva (1998) observes the distribution of HEC in Sri Lanka. Jayawardena (1998) believes that HEC is a serious problem in unprotected areas of Northwestern and *Mhaweli* region in the country. Several studies have reported on the consequences of HEC. Kem and Santiapillai (2000) provide recent estimates of elephant mortality. De Silva and Attapattu (1997) report human deaths caused by elephant attacks. Weerakoon (1999) estimates the level of crop and property damage caused by elephants. Bandara and Tisdell (2002) examine land-use issues involved in conservation of elephants in Sri Lanka.

Kotagma (1997) summarises important actions that were taken by the Department of Wildlife Conservation (DWC), the primary agency in charge of conservation in Sri Lanka to mitigate HEC in affected areas since the mid-1970s. Most policy actions taken by DWC were transient measures and have been taken largely to tie over a particularly critical time on an *ad hoc* basis (De Silva, 1998). Fernado (1993) believes that these actions have failed to address fundamental issues in the conservation of elephant and mitigation of HEC. Thouless (1994a) observes the root causes for this are policy and institutional failures. However, wildlife authorities in the country still rely upon law enforcement and conventional management techniques such as translocating problem elephants, promulgating protected areas, rehabilitating elephant drives and establishing deterrents to resolve HEC-related issues in the country. Given the nature and the present status of the HEC in Sri Lanka, such techniques are inadequate and in

many cases, inappropriate. Alternative approaches will need to be developed that must consider not only the welfare of the elephant and its habitat, but also address the problems that arise for its human neighbours competing for limited resources.

It is impossible to eliminate elephant related conflicts as long as wild elephants remain in Sri Lanka. However, they can be ameliorated and management objectives should be to reduce HEC to a level tolerated by local people (Hoare, 2000). There is no universal recipe to address such conflict. The interventions that reduce the problem in one area or a country may be completely ineffective in another area or a situation. However, there is a growing consensus that natural resources conservation and mitigation of resource-user conflicts requires greatly increased involvement of local people and various other stakeholder groups who often have different (and sometimes conflicting) value assessments of the same resource.

Opinions on how local people and other interested parties view wildlife vary widely. Marnham (1981) believes that rural resistance to conservation areas is high and that rural people have little interest in wildlife conservation. Infield (1988) claims that marked difference exists between local people and nature lovers over national parks and other forms of nature reserves. Gillingham and Lee (1999) examine the importance of the information gathered from surveys of rural peoples' conservation attitudes in the context of conservation policy design and evaluation. Hill (1998) points out that attitudes of local people towards wildlife may vary within a community according to gender and prior experience of individuals with wildlife. Bateman and Langford (1997) argue that non-users' value assessments of wildlife and other natural resources varies with the socio-economic characteristics of the respondents. White *et al.* (2001) observe that the motivation to contribute to the conservation of wildlife in the context of British

mammals increases with increased awareness of the threat faced by the wildlife in question.

3. The Resource/Pest Status of Wild Elephants: Modelling Stakeholder Perceptions and Policy Responses

The differences in perceptions of stakeholder groups can easily lead to miscalculations in the management action required to conserve or eliminate a wild species. Weerakoon (1999) observes a marked difference in perceptions between farmers and local wildlife officials in the Northwestern region in Sri Lanka. Local wildlife officials believe that the current elephant population should be maintained intact in this region for ecological reasons. They argue, that if the current elephant population in this area is fragmented into small groups, the elephant will become more vulnerable to extinction due to demographic, environmental and genetic stochasticity. They also believe that this ecological objective can easily be achieved within the limits of existing national parks in the region if human encroachments into these parks are terminated. In contrast, most farmers in this area view elephants as a major threat to their livelihood and consider them to be agricultural pests. Several recent studies such as Tisdell and Xiang, 1998, Ramakrishnan, *et al.* 1997, and Nyhus *et al.* 2000 have also highlighted a similar antipathy of local farmers to elephants in other countries in Asia. These differences in the perception of farmers and local wildlife officials highlight the conflicting status of the elephant as an agricultural pest or an environmental resource.

Tisdell (1979) provides a detailed account of the economic aspects that distinguish the status of a wild animal as a pest or an asset in the context of kangaroos in Australia. He argues that management methods are often influenced by perceptions of whether a

given species is an asset or a pest, but many species cannot be neatly grouped into these categories. This is because there is often a conflict between different groups in the society as to whether a given wild animal species is a valuable resource to be conserved or a pest to be eliminated. It may be less complicated to designate a species, which causes some degree of commercial damage to agricultural practices or reduces the potential output of a given economic venture, as an agricultural pest. However, it is quite difficult to decide whether a wild animal is a pest or a resource when it causes some degree of commercial damage while providing commercial and other forms of benefit to the society at the same time.

Tisdell (1982) also discusses these complications in the context of the feral pig in Australia. In his analysis he raises two important questions: a) do the total benefits from a species outweigh the total costs of its damages? b) should a species be regarded as a pest if its total benefits are less than the costs of its damages, and as an asset if this is not the case? He argues that a *net pest* situation occurs in the first case where the total benefits are less than the costs of damage caused by a wild animal and a *net asset* exists in the latter case. Therefore, it is irrational for one to conclude that it is optimal from the management point of view to eliminate or reduce the number of *net pests*, even if the cost of doing so is zero or very little. For instance, it may be possible for one to take suitable precautions at little cost to reduce the damage and to avoid *net pest* situations. This in turn converts *net pest* situations into a *net asset*. Hence, the best way of dealing with a *net pest* may not be to reduce the population of the species.

More recently Zivin, *et al.* (2000) developed this aspect further in a case study of feral pigs in the California rangeland that *net pest* situations can be managed by allowing landowners to capture part of the benefits generated from the wildlife by selling

hunting or viewing rights to the non-farming communities. The authors also believe that by doing so it is also possible to change the landowners' negative perception towards the wildlife responsible for crop damage in their farming field. Hone (1994) discusses the fact that existing prescriptive analyses of optimal farm-level pest–control strategies generally ignore possible multiple–use benefits of wildlife. Therefore, the status of wildlife should be determined in relation to its multiple-use. Hill (1997) believes that most existing analyses of wildlife management issues do not recognize the potential interaction of a wildlife resource with other production activities. Barnes (1996) analyzed the issues in wildlife management in the context of the African elephant. In his analysis, he demonstrates how poorly defined property rights create an open-access problem, limiting the extent to which landowners can capture recreational benefits from elephants that exist on (or occasionally pass through) their land.

Individual farmers in may HEC-affected areas face difficulties in distinguishing the status of wildlife as pest or valued assets due to external effects or spillover problems. Ramirez and Saunders (1999) examined the consequences of external effects on farmers' perceptions about agricultural pests. Tisdell (1979) also describes three pest control possibilities involving external effects and liable to influence the perceptions of farmers: a) on a property the species may be below the population threshold where damage is observed, but the population on the property may roam to other properties causing commercial damage or provide a nucleus for infestation on other properties, b) while a species may be a pest on the property, it may be relatively more damaging on other properties. Once again incorrect inferences may be drawn from individual experiences and the species is unlikely to be optimally controlled, c) the species may be equally damaging on all properties but because of the mobility of its members, landowners may spend less on the control of the species than is socially optimal.

Figure 1 illustrates these possibilities for elephants and possible consequences for farmers who are damaged by elephants. If the number of wild elephants present on a given individual farm is equal to P^3 and a similar number of elephants is also present on all the other individual farms, all the farmers in the area may undertake less control than is socially optimal for farmers as a group, since each ignores the effects the animals have on other farmers. On the other hand, if the number of animals present on a given individual farm is below the damage threshold level such as P^*, the farmer may not regard the elephant as a pest on the property, but from a social point of view the population on the property it could be a pest.

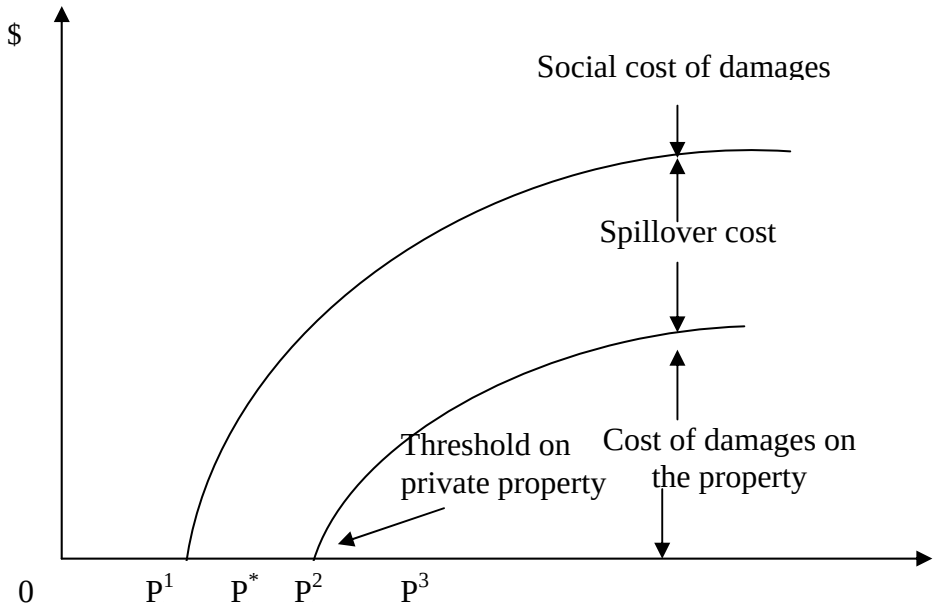

Figure 1: External effects of elephants and pest assessment by individual farmers

Tisdell and Xiang (1998) point out that the same individual may have ambivalent attitudes about whether a species of wildlife is a pest or an asset and that the attitude of the same individual can alter with circumstances. Furthermore, groups in society, such as farmers and conservationists, often place conflicting values on wildlife, one group regarding it as a pest the other seeing it as an asset. Tisdell (1979, 2002) presents an

economic analysis based on Kaldor-Hicks criterion to deal with such conflict about the value of a species taking kangaroos in Australia as an example. Although his analysis is illustrated by kangaroos, it can be extended to analyse similar problems involving other species such as wild elephants. Furthermore, this analysis has special relevance to elephants, because they are also valued differently by different individuals and groups of people in the same society.

Currently, about 46% of the elephant population in Sri Lanka, as elsewhere in the Asian elephant's range, occurs outside the officially gazetted protected areas (De Silva, 1998). Moreover, an increase in human encroachments into these areas has led to a reduction and fragmentation of the elephants' habitats resulting in alterations in their access to food and water and disruption of their home ranges and movement patterns. Consequently, the elephant populations in Sri Lanka have become concentrated in isolated protected areas and remnant forest habitats. Elephants often extend their range into human settlements, commonly to feed on a wide variety of cultivated food and cash crops but also sometimes damaging food stores, water installations or fences and barriers, and occasionally injuring or killing people. In Sri Lanka, the long-term survival of the Asian elephant appears to depend on their use of areas outside officially gazetted protected areas.

Bandara and Tisdell (2002) propose the application of integrated economic policies for the conservation of elephants and alleviation HEC in Sri Lanka. In this analysis, they have taken up the question whether the present protected areas in Sri Lanka have the capacity to ensure the long-term survival of Sri Lanka's population of wild elephants. It was found that they do not, and that the long-term survival of Asian wild elephant populations depends on their being able to use protected areas as well as private land.

So the long-term conservation of wild elephants calls for integrated policies involving both public and private landholders. This requires the development of public compensation policies and appropriate strategies based on stakeholder perceptions to encourage private landowners and farmers in the unprotected areas to tolerate the presence of elephants on their private land. It is in this context that our urban and rural surveys have particular relevance.

4. Attitudes of Urban Dwellers and Farmers to Environmental Conservation in General and Conservation of Elephants in Particular: Empirical Evidence from Sri Lanka

4.1. Samples

The data presented in this analysis were collected as part of two contingent valuation surveys conducted in Sri Lanka in 2001. One of these surveys involved a sample of 300 randomly selected urban residents in three major housing schemes (*Jayanthipur*a, *Jayawadanagam*, and *Anderson Flats*) in Colombo, the capital of Sri Lanka. The Housing Development Authority of Sri Lanka classifies these schemes as upper middle class, middle class and lower middle class housing schemes respectively. This classification is based on the value of the property and other urban facilities in the area where these housing schemes are located i.e. public schooling, shopping centres and recreational sites. A hundred residents from each of these housing schemes were chosen as the sample. So stratified sampling procedure was adopted in selecting this sample.

The other survey was conducted with a sample of 300 randomly selected local farmers from six selected villages in three *Gramaniladari* Divisions (the lowest local

government administrative unit in Sri Lanka) on the basis that they experienced a high level of crop damage as designated by Desai (1998). Three of these villages in this sample (*Karuwalagas wewa, Raswhera,* and *Meegalawa*) are located within the northern boundary of *Wilpatthuwa* National Park and the other three (*Galkiriyagama, Makulawa,* and *Itharandeniya*) are adjacent to it. This region supports a substantially large elephant population of around 1500 animals. The issue of HEC is widespread in this region. Three of these villages in the sample (*Karuwalagas wewa, Raswhera, Meegalawa*) are located within the northern boundary of *Wilpatthuwa* National Park and the other three (*Galkiriyagama, Makulawa, Itharandeniya*) are adjacent to it. A stratified sampling procedure was also adopted in selecting this sample.

4.2. Data Collection and Analysis

The data were collected from June to August 2001 by means of an interview schedule (IS). A face-to-face survey was conducted by using contingent valuation techniques as a survey instrument. Nine graduate students from the Faculty of Graduate Studies of the University of Colombo were used as interviewers to administrate the IS. The IS included a mixture of open-ended and fixed-response questions. Open-ended questions were included to elicit more extensive discussions of some of the issues faced in the conservation of the elephant in Sri Lanka. The fixed-response questions (attitude statements) were used in examining the various dimensions of the respondents' conservation attitudes in general and elephant conservation in particular. These questions are presented in Boxes 1 and 2. The respondents' opinions about the attitude statements were recorded as 'agree', 'neutral' and 'disagree'.

Box 1: The fixed-response questions presented to Sri Lankan respondents to assess their opinion towards the environmental conservation in general.

A. Sri Lanka should not encourage development programs such as tobacco cultivation in central highlands that cause serious environmental damage.

B. We should not invest in nature conservation; sacrifice our income and standard of living so that the next generation may benefit from the plants and animals on Earth.

C. No matter what the environmental costs are today Sri Lanka needs to exploit its natural resource base to increase employment and incomes.

D. Animals have a right to exist even though they may be of no use to humankind and people who poach them should be punished.

E. It is very important to have places where native wildlife and plants are preserved.

A series of supplementary questions were included in the IS to gather the necessary socio-economic information at the individual respondent level. This information was used as independent variables in the logit regression analysis undertaken in this study. The wording and ordering of the questions were also carefully thought out to avoid unnecessary complications that could have arisen with the background and level of understanding of the respondents in these two samples. The majority of interviews were carried out in *Sinhales*, a local language spoken by the majority of the people in Sri Lanka. Each interview took on average approximately one hour and thirty minutes to complete.

Box 2: The fixed-response questions presented to to Sri Lankan respondents to assess their opinion towards the elephant conservation in particular.

A. Conservation of elephants in the wild is important for both economic and non-economic reasons**.**

B. The Government and international organisations should pay more attention to elephant conservation and the mitigation of HEC in the country.

C. Local farmers in the vicinity of the nature reserves should be allowed a greater freedom to control the 'problem elephants' which cause crop and property damage.

D. The current wild elephant population in Sri Lanka is between 3,000-5,000 animals. It does not matter if this number is reduced by 50% to provide more land for agriculture and human settlement.

D. The value of the protected areas and their beauty would be the same, with or without elephants.

Separate analyses are presented for respondents' responses towards environmental conservation in general and elephant conservation in particular. A multivariate logit regression model was used to identify which of these variables are significant in predicting respondents' attitudes towards the conservation of the elephant. Results are presented as significance levels for separate variables, while the model χ^2 values reported show the significance of the final logit regression model. The respondents' responses to the fixed-response questions in Boxes 1 and 2 were recorded as positive and negative responses to develop necessary dependent variables in the estimation of logistic regression models. These models were estimated to identify which factors have influenced the respondents' responses towards environmental conservation in general and the elephant conservation in particular both at urban an rural sample levels. The recording of respondents' responses was based on the assumption that a neutral response could indicate a potentially negative attitude (after Newmark *et al*. 1993 and Gillinghamn and Lee, 1999).

Two sets of independent variables were used in the estimation of logit regression models based on the urban and rural sample. Some variables were common in both sets. One of these common sets was used in the analysis of respondents' responses towards environmental conservation in general and included: gender (GEN), age (AGE), education (EDU), income (INC), membership of an environmental society (MEM), anti development sentiments (ADS), occupation (OCC), respondent's awareness about the current conservation issues in the country (ACS), and respondent's interest in visiting and utilising nature reserves and other nature-based recreation facilities (USE). These enabled a comparative analysis of urban and rural responses to be completed.

Another set of independent variables was used in the analysis of respondents' responses towards elephant conservation in particular, with the final ones mentioned below relevant only to rural respondents. These variables include: Gender (GEN), age (AGE), education (EDU), income (INC), pro development sentiments (PRD), respondent's awareness about current issues in the conservation of elephants and mitigation of HEC (AWA), membership of an environmental society (MEM), non-use value of the elephant (NUE), value of crop and property damage caused by elephants during the last five years (VCD), size of the farm property (SFF), respondents' interest in visiting and utilising nature reserves and other nature-based recreation facilities (USE).

4.3. Attitudes towards environmental conservation in general

Although some variations existed in responses between local farmers and city dwellers in the samples, the overall findings of this study indicate that the majority of the

respondents (both urban and rural) have positive attitudes towards environmental conservation in general. Harcourt *et al*. (1986) explored public attitudes to wildlife conservation in developing countries using surveys and found that such public attitudes in developing countries differ little, if at all, from industrialised countries. Fiallo and Jacobson (1995) observe a similar pattern of attitudes towards the conservation of natural resources in a comparative study of residents within and outside the *Machalilla* National parks in Ecuador. More recently, Gillingham and Lee (1999) reveal somewhat similar results in peoples' attitudes towards nature conservation in a case study of the *Selous* Game Reserve in Tanzania. The findings of these studies and ours suggest that, contrary to the assumptions of many Western conservationist and development agencies, people in less developing countries, particularly local farmers, are not entirely antagonistic to wildlife conservation and ignorant of conservation issues.

Table 1: Attitudes towards environmental conservation in general - Sri Lankan Survey, 2001

Attitude Statements & Response[(a)]		**Urban Sample (n = 300)**		**Rural Sample (n = 300)**		**Weighted mean relative frequency**
		Frequency	Relative Frequency	Frequency	Relative Frequency	
A	Agree	266	88.6	208	69.3	76.3
	Neutral	12	4.0	38	12.7	9.3
	Disagree	22	7.3	54	18	14.4
B	Agree	26	8.6	30	10.0	9.3
	Neutral	16	5.3	68	22.6	16.4
	Disagree	258	86	202	67.3	74.3
C	Agree	36	12	18	6.0	9.0
	Neutral	45	15.0	74	24.7	20.7
	Disagree	219	73.0	208	69.3	70.3
D	Agree	282	94.0	274	91.3	88.2
	Neutral	8	2.6	12	4.0	5.0
	Disagree	10	3.3	14	4.7	6.8
E	Agree	276	92.0	271	90.3	87.3
	Neutral	10	3.3	19	6.3	7.3
	Disagree	14	4.6	10	3.3	5.5

(a) See Box 1 for the list if these attitude statements.

Table 1 summarizes the responses received for the attitude statements presented to the respondents both in urban and rural samples. Weighted mean relative frequency estimates in this table illustrate the respondents' attitudes towards nature conservation both in the urban and rural samples as a whole. Little over 90% of the respondents agreed that wildlife have a right to exist even though they may be of no use to humankind (Box 1, statement D). Similar responses were also obtained for attitude statement E, which indicates that it is important to have places for the conservation of wildlife and native plants. These responses were used to cross-check the respondents' responses for the opposite statements such as 'B' and 'C'. About 86 % of the city dwellers in the sample agreed that the investment in nature conservation is needed to secure the needs of future generations (statement 'B'). Although there was a high level of 'neutral' responses recorded for this statement, about 67% of the local farmers agreed that the investment in nature conservation is needed for the same reason. The responses for statement 'C' indicate that the respondents in both samples had similar views about the utilization of natural resources to generate alternative employment and income opportunities. Statement 'A' was used to assess the respondents' attitudes towards contemporary development programs that have resulted in great public concern because of their possible negative impact on the natural environment. The responses received for this statement indicate that respondents in both urban and rural samples do not support development programs that cause serious environmental problems.

4.4. Attitudes towards elephant conservation in particular

Perceptions about elephant conservation were examined by using five common attitude statements (see Box 2). The summary of the responses obtained is presented in Table

2. Weighted mean relative frequency estimates in this table illustrate the respondents' attitudes towards elephant conservation both for the urban and rural samples.

Table 2: Attitudes towards the conservation of the elephant – Sri Lnaknan Survey, 2001.

Attitude Statements & Response[(a)]		Urban Sample (n = 300)		Rural Sample (n = 300)		Weighted mean relative frequency
		Frequency	Relative Frequency	Frequency	Relative Frequency	
A	Agree	272	90.7	198	66	75.4
	Neutral	20	6.7	66	22	16.9
	Disagree	8	2.6	36	12	7.7
B	Agree	254	84.7	284	94.6	85.7
	Neutral	28	9.3	10	3.3	7.4
	Disagree	18	6.0	6	2	6.9
C	Agree	14	4.6	237	79.0	39.0
	Neutral	32	10.7	36	12.0	12.3
	Disagree	244	81.3	27	9.0	48.7
D	Agree	6	2.0	166	55.3	27.2
	Neutral	12	4.0	86	28.7	19.0
	Disagree	282	94.0	48	16	53.8
E	Agree	12	4.0	28	9.3	8.4
	Neutral	14	4.6	75	25.0	16.1
	Disagree	274	91.3	197	65.7	75.5

(a) See box 2 for the list of these attitude statements.

Although some variations existed in the responses to statements 'A' and 'E', the majority of respondents interviewed were ostensibly in favour of the conservation of elephants in Sri Lanka. Several authors have observed a similar situation for conservation of the elephants and other wild animals. Infield (1988) reports similar results from South Africa. Interestingly, in Infield's study, men were much more likely than women to support the conservation of elephants. Hill (1998) observes that nearly 65% of the respondents in a sample of 59 men and 57 women on the southern edge of the *Budongo* forest reserve were in favour of elephants being protected in Uganda. Hoare (1999) argues that differing attitudes about elephant conservation between local

farmers and other people are negligible in a case study of the *Sebungwe* region in northwest Zimbabwe. He further argues that elephant conservation is a serious local political issue and has now become an African conservation problem. Thouless (1994b) examines the determinants of the HEC in a case study in the Laikipia/Samburu region of northern Kenya. In this study, he argues that most of the studies carried out on HEC have exaggerated the differences in opinion about elephant conservation held by the local farmers and other interest groups.

Statement 'D' was used to assess the respondents' reaction to a reduction in the current elephant population in the country by 50% in order to provide more land for agriculture and human settlements. About 94% of city dwellers rejected this proposition as a solution to agricultural land scarcity in Sri Lanka. However, about 94% of respondents in the rural sample accepted this proposition. This situation discloses not only farmers' animosity towards crop-raiding elephants but also may reflect their dissatisfaction with government polices and commitment in resolving the HEC in the country. Hill (1998) observes a similar situation in a study of HEC in Uganda. In this study, he argues that, since there is no proper mechanism to compensate for the additional socio-economic costs incurred by rural people living in proximity to the elephant ranges in Uganda, most local farmers would eliminate elephants from their environment if given the choice. Therefore, he argues that conservationists must find ways to raise public tolerance of elephants, and this requires a better understanding of elephants as an agricultural pest. This is also the case for the Asian elephant. Bandara and Tisdell (2002) argue that the survival of the elephant in Sri Lanka hinges on improved schemes to compensate farmers for damage caused by elephants.

Statement ‘B’ was used to assess the respondents’ attitudes towards government involvement in the conservation of elephants and its mitigation of HEC. The majority of the respondents believed that both government and international organisations should pay more attention to both these issues. In Sri Lanka, a national policy for elephant conservation and mitigation of human-elephant conflict has to be developed. Desai (1998) sees the absence of such a policy and clearly defined management strategies as the major reasons for the current elephant-related problems in the country. While several government agencies, such as the Department of Wildlife Conservation, *Mahaweli* Authority and the Department of Social Welfare have been involved in taking various actions to alleviate human hardship caused by elephant crop raiding and the resulting human elephant conflict (HEC) over the last three decades (Jayewardena, 1998), most policy actions taken by these organisations have appeared as transient measures and have been taken largely to tie over a particularly critical time on an *ad hoc* basis (De Silva, 1998). Weerakoon (1999) also observes similar weaknesses in the involvement of these organisations in alleviating elephant crop raiding.

Respondents were asked to express their opinion about whether local farmers in the vicinity of the nature reserves should be granted more freedom to control the ‘problem elephants’ which cause crop and property damage in Sri Lanka. About 81% of the respondents in the urban sample rejected this proposal. Our preliminary discussions with the respondents in the urban sample indicate that they believe that if the local farmers were granted a free hand to control crop raiding elephants, they will use quite destructive methods such as guns, traps and poison, and this could eventually lead to the elimination of the entire elephant population in the country. Therefore, urban respondents believe it is quite inappropriate for farmers to be granted complete freedom to control elephants. They believe the government and wildlife authorities

should take responsibility for elephant management and land use planning in the elephant region. However, about 79% of the farmers in the rural sample stated that they should be allowed more freedom to control elephants.

The majority of farmers reported that they relied on conventional "scaring and chasing" methods to control elephants. They stated that the methods they use have very little effect on elephant crop-raiding and have reportedly become less effective over time. This is because crop-raiding elephants soon learn to ignore these deterrents and develop resistance to crop protection measures similar to these of certain other species of agricultural pests. Consequently, elephants have developed no fear of such control measures and continue to raid the cultivated fields for easy fodder. Tisdell and Xiang (1998) observe a similar situation with the use of conventional elephant control methods by the farmers on the boundaries of the Xishuangbanna State Nature Reserve, Yunnan in China.

5. Reasons Why the Elephant Should be Conserved: Views Expressed by Respondents

After respondents to our surveys in both urban and rural samples were presented with the information about the current status and issues involved in elephant conservation in Sri Lanka, they were asked whether they thought that the Asian elephant in Sri Lanka should be conserved. The responses were recorded as 'yes' (coded as 1), 'no' (coded as 0). For those who positively responded, there was a follow-up question: W*hy do you think that elephants in Sri Lanka should be conserved?* Several reasons for the conservation of elephants were identified in a pilot survey for this study. These reasons were presented along with the other information in order to obtain respondents'

responses for this question. Respondents were then asked to rank these reasons in descending order.

Table 3: Respondents' ranking of the reasons for elephant conservation – Sri Lankan survey, 2001.

Why elephants should be conserved	Respondents' ranking of the reasons	
	Urban Sample[a]	**Rural Sample**[b]
Altruistic, bequest and existence value[c]	1	6
Biodiversity and ecological value	2	7
Historical, cultural and religious values[c]	3	1
Our responsibility for future generations	4	2
Other reasons[*]	5	3
Educational and scientific value	6	6
Value of ivory and other elephant products	7	4

Note: a: n = 280; **b:** n = 252; **c:** These factors were significant at the 0.05 level of significance with positive coefficients in the final logit regression models which developed for urban and rural samples in assessing respondents' responses for the payment principle question on elephant conservation and to be rid of problem elephants respectively. * This include the respondents' beliefs such as that the government alone can not solve the elephant related problems in the country.

Our analysis found that, altogether, a total of 78% of respondents both in urban and rural samples favoured the elephant being protected in Sri Lanka. A summary of the respondents' ranking of the reasons for elephant conservation is presented in Table 3. As indicated in this table, respondents both in the urban and rural samples did not propose the consumptive direct use value of Asian elephants as a significant reason for their conservation. Non-consumptive use values are by far the most important reasons given for the conservation of this species. It appears that rural dwellers (farmers) give much more weight to historical, cultural and religious values than do the urban residents who relatively give more weight to the altruistic, bequest, and existence values of the elephant. Moreover, urban dwellers put more weight on the biodiversity

and ecological value of the elephant than rural respondents. However, urban dwellers do not neglect the historical, cultural and religious values of the elephant either. Such a sentiment is understandable due to the elephant's long-standing cultural and religious status in traditional Sri Lankan society. Some other observations are pertinent also. Farmers give more weight to the direct use value, such as of ivory and other elephant products, than do the urban dwellers. A considerable number of respondents both in the rural and urban samples believe that the conservation of elephants for future generations is their responsibility and acknowledge that the government alone can not fulfil this task, given current financial difficulties.

6. Factors Influencing Attitudes Towards Conservation: Logit Analysis

Analysis carried out in examining respondents' attitudes towards nature conservation in general and elephant conservation in particular revealed that, although some variations existed, the majority showed positive conservation attitudes. However, as might be expected, the percentage of positive responses given by the respondents in the urban sample was higher than that for the rural sample. A total of about 87.56 % of the urban and about 63.88% of the rural sample respondents were in favour of both nature conservation generally and elephant conservation. Tables 4 and 5 present the revised version of the respondents' responses for the attitude statements along with the final results of the logit regression analyses. This revision has been carried out based on the assumption that a neutral response could indicate a potentially negative attitude (after Newmark *et al*. 1993 and Gillingham and Lee, 1999). Multivariate logit analyses were carried out to identify the factors that influence respondents' attitudes towards conservation in general and elephant conservation in particular. The preliminary

multivariate logit regression analysis was undertaken by using the Statistical Package for Social Sciences (SPSS) Version 10.0 at the $p < 0.05$ significance level.

Pate and Loomis (1997) describe the logit analyses as the most commonly used statistical analysis in contingent valuation studies. Yoo *et al.* (2001) examines the advantages of this approach in the context of double bounded dichotomous choice questions that were proposed by Hanemann (1984). Jaibi and Raa (1998) provide a list of economic applications of this model. Sellar *et al.* (1986) note the merits of logit model: first, its estimation is relatively simple; second, it usually provides a good approximation to the probit model. When logit is selected as the proper tool for analysing quantal choices, the next question is to specify the appropriate functional form for the explanatory factors. Economic theory can then be of some help in providing a relevant theory of choice. Using this theory, one can relate the probabilities of particular choices to a set of behavioural rules reflecting decision-maker's preferences. McFadden (1974) discusses the dichotomous choice theory corresponding to logit specification. The mathematics of double-bounded dichotomous choice responses are a straightforward extension of the signal-bounded models (Kanninen and Khawaja, 1995). Usually, the preference function (logit equation) that is maximised by the decision-maker is conveniently assumed to be linear in the parameters, although it may be either linear or non-linear in the explanatory variables.

Table 4: Results of the logit analysis for the factors that influenced respondents' attitudes towards conservation in general based on Sri Lankan survey, 2001 (Neutral responses treated as negative).

Conservation attitudes in relation to attitude statements[(a)]		Positive response (%)	Negative response (%)	Influencing factors	Final logit model		
					χ^2	*df*	*P*-Value
A	Urban	88.6	11.4	EDU, AGE, ACS	56.1	6	< 0.002
	Rural	69.3	30.7	EDU, GEN, ACS	47.2	5	< 0.002
B	Urban	86.0	14.0	EDU, GEN, INC	41.4	5	< 0.002
	Rural	67.3	32.7	EDU, GEN	23.9	4	<0.001
C	Urban	73.0	27.0	EDU, INC, ADS	39.8	5	< 0.002
	Rural	69.3	30.7	EDU, GEN, AGE	37.5	5	< 0.002
D	Urban	94.0	6.0	EDU, MEM, USE	54.9	6	< 0.001
	Rural	91.3	8.7	EDU, GEN, AGE	47.3	5	< 0.001
E	Urban	92.0	8.0	EDU, MEM, GEN	33.9	5	< 0.001
	Rural	90.3	9.7	EDU, AGE	25.6	4	< 0.012

(a) See Box 1 for the list of these attitude statements.

Note: ACS = Awareness of current conservation issues, AGE = Age, ADS = Anti development sentiments, EDU = Education, GEN = Gender, INC = Income, MEM = Member of an environmental society. USE = Resource users

Table 5: Results of the logit analysis for the factors that influenced respondents attitudes towards elephant conservation in particular based on Sri Lankan survey, 2001(Neutral responses treated as negative).

Conservation attitudes in relation to attitude statements[(a)]		Positive response (%)	Negative response (%)	Influencing factors	Final logit model		
					χ^2	*df*	*P*
A	Urban	90.7	9.3	Those who EDU, NUE,	44.1	6	< 0.001
	Rural	66.0	34.0	AGE	37.2	4	< 0.001
B	Urban	84.7	15.3	GEN, VCD, AGE	31.4	4	< 0.002
	Rural	94.6	5.4		29.9	5	< 0.001
C	Urban	81.3	18.7	EDU, AWA AGE, GEN,	49.8	6	< 0.003
	Rural	9.0	91.0	EDU	36.5	5	< 0.003
D	Urban	94.0	6.0	EDU, NUE,	44.3	5	< 0.001
	Rural	16.0	84	AWA	47.3	4	< 0.001
E	Urban	91.3	8.7	VCD, GEN	53.2	5	< 0.002
	Rural	65.7	34.3	EDU, AWA,	24.4	4	< 0.002

(a) See Box 2 for the list of these attitude statements

Note: AWA = Awareness of current issues in elephant conservation and HEC
AGE = Age, VCD = Value of crop damage, EDU = Education,
GEN = Gender, NUE = Non use value of elephants,
PRD = Pro development sentiments, SFF = Size of the farming field
USE = Resource users

Of the factors found to influence the conservation attitudes of the respondents both in urban and rural samples, the level of education was identified as a significant predictor of responses for about 85% of the respondents in both urban and rural samples. Support for conservation was positively correlated with the level of educational attainment of respondents. Heinen (1993) observes a similar situation in a study of people's attitudes towards the wildlife in the Kosi Tappu Wildlife Reserve in Nepal. In this study, he reveals that those respondents with higher household literacy rates were more likely to have positive attitudes about the wildlife in the reserve.

In the early 1980s, the Ministry of Education in Sri Lanka began including contemporary conservation issues in the country in the high school educational curriculum. The introduction of a new subject on environmental studies may have influenced younger people to be more supportive of nature conservation and wildlife. Education is often considered to be an initial step in improving people's attitudes towards conservation. Many authors have suggested that education is necessary to achieve public support for nature conservation (Parry and Campbell 1992, Gillingham and Lee 1999, and White *et al*. 2001). Fiallo and Jacobson (1995) promote the use of educational programmes to expand adult literacy and explain the benefits of protected areas as a component of conservation programming. Works of Infield (1988), Parry and Campbell (1992), Newmark *et al*. (1993) also reveal that education levels or specific knowledge about conservation are positively correlated with more favourable attitudes towards nature conservation.

Age is found to be the second major factor positively associated with pre-conservation responses of about 65% of respondents in both samples. However, in most cases this variable was also correlated with the level of education but not closely. Expansion of the free education system to rural areas and the incorporation of environmental education into the school curriculum have a positive impact on the younger peoples' awareness or specific knowledge about contemporary conservation issues. Hadker *et al*. (1997) observes similar association of age and level of education in a contingent valuation study conducted to survey people's opinions towards the preservation of Borivli National Park, Bombay in India. In this study, they suggest that positive attitudes towards the preservation of nature could be explained through the individual willingness to pay amounts that correlate highly with the respondents' age, years of schooling and gender. They also notice an interesting relationship between age and the

years of schooling. Younger respondents are often found with a higher number of years of schooling than the older ones in the sample. This is quite similar to the situation found in Sri Lanka.

Gender also can be an important predictor of respondents' opinions about conservation. Both men and women in our urban sample expressed similar attitudes towards both conservation in general and conservation of elephant in particular. By contrast, in the rural sample women were more likely than men to express negative attitudes towards elephants. For instance, about 70 % of the women respondents agreed with the statement that there should be 50% reduction of the current elephant population to provide more land for agriculture, and that farmers should be given greater freedom for to control problem elephants. They consider the elephant to be a destructive species of wildlife that disturbs their social well-being and family life. Such a sentiment is understandable. Some of the responding women had lost their husbands or elderly male members in the family as a result of elephant attacks. Others have numerous problems in their family life, including alcoholism and burdens of debt. Kulathunga (1999) examines the social impact of the elephant-related deaths in a sociological study on HEC in southern Sri Lanka and finds that such deaths make affected families very vulnerable by increasing their social burden and economic dependency. Ramakrishnan *et al.* (1997) observe a similar situation for rural communities on boundaries of the two elephant corridors, Sujalkuttai-Bannari and Kallar-Vedar Colony, in South India.

Our study finds that the respondents' negative attitudes towards the elephant conservation in the rural sample is also influenced by the value of crop damage caused by elephants on their farms. The majority of farmers who experienced crop damages during the last five years agreed with statements C and D (see Box 2). These

statements were used to assess their opinion towards elephant conservation. The value of crop damage (VCD) caused by elephant during the last five years was used as one of the socio-economic factors in this analysis. In our analysis, we found that variable VCD is significant at 0.05 level in predicting the rural respondents' responses to these two attitude statements. Thouless (1994b) observes a similar situation in a study of human-elephant conflict in northern Kenya. In this analysis, the author notices that many farmers on the private land in the vicinity of Laikipia National Park in northern Kenya display ingrained hostility to elephants mainly due to the damage caused to their cultivated crops and farming systems. More recently, Nyhus *et at*. (2000) disclose that the lack of government incentives to combat elephant crop raiding and inadequate farmer compensation for farm damage caused by eleephants has increased farmers' negative attitudes towards elephant conservation programmes in Sumatra, Indonesia.

In our data collection, elephants were found to be responsible for about Rs 12049 (US $128.2) worth of crop damage on average per farmer/per cropping season during the last five years in the *Galgamuwa* divisional secretariat division of the northwestern region of Sri Lanka. This sample (our rural sample) consists of 300 farming families chosen randomly from six selected villages near to Wilpathuwa National Park. This amount of crop damage caused by elephant in this sample is equal to little over one third of a farmer's earnings of a given cropping season. However, the available evidence suggests that the existing compensation scheme has not been able to cover even one-tenth of the crop damage suffered by the farmers in this area. This scheme suffers several deficiencies. Our preliminary discussions with the respondents in the rural sample indicate that the amount of compensation paid in general is far from adequate and payment is too slow. These respondents also feel that that the payment should be more realistic, given the present high cost of living and should be made

within one month or so after reporting the damage. Unless the wildlife authorities in the country seriously address these matters, it may not be easy to change the negative attitude of the farmers and rural communities towards the elephant in the vicinities of the elephant's range in Sri Lanka.

7. Contingent Market Valuation for Elephant Conservation and Mitigation of Human-Elephant Conflict: Additional Logit Analysis

The respondents in both samples were presented with hypothetical conservation and HEC-mitigation strategies in order to assess their responses to the payment principle questions. These strategies included: a) providing extra protection around the existing national parks and protected areas, b) translocating excess and troublesome elephants, c) domestication of the elephants and d) establishing elephant orphanages and recreation centers to promote eco-tourism. The respondents were also provided with a set of updated information about current issues in elephant conservation and mitigation of HEC in the country. Then respondents were asked to assume that an autonomous body, reputed for its efficient and honest work, would undertake these strategies so that the objectives of elephant conservation and mitigation of HEC could be achieved. Following the description of the establishment of an autonomous body and the possible benefits of the implementation of the above-mentioned strategies, two separate contingent market valuation questions were presented to the respondents in these two samples. Two different sets of bid values were used to assess their responses.

Respondents in the urban sample were asked: W*ould you be willing to pay Rs X from the monthly income of your household, that is Rs X per month, starting from January 1st 2002, towards the establishment of the proposed autonomous body to implement the*

above mentioned programs to conserve the elephants in the country. Respondents in the rural were sample were asked: *For the next five years, would you be willing to pay Rs. X of the monthly income of your household starting from January 1st 2002, towards the establishment of the proposed autonomous body to implement the above mentioned programs to be rid of the elephant pest problem in this area.* These questions were presented as a double-bounded dichotomous choice question. Each respondent was presented with a sequence of bids and asked for a 'yes' or 'no' vote on whether the respondent's WTP equals or exceeds each bid. The second bid is conditional on the respondent's response to the first bid, lower if the first response is 'no' and higher if it is 'yes'.

The frequencies and free probability estimates for 'yes' responses to the payment principal questions are presented in Table 6. Of the 300 respondents in the urban sample, 266 (88.7%) answered positively to the payment principle questions and 34 (11.3%) respondents protested against all the bid values offered by the payment principle questions. However, about one third (32.35%) of the protest respondents were prepared to contribute less than Rs 25.00 which is the lowest bid value offered by the payment principle questions. Whitehead (1992) observes a similar situation in a contingent valuation study of a loggerhead sea turtles (*Caretta caretta*) protection programme in US.

Table 6: Frequencies and probability estimates for the yes response to the payment principle questions

Bid value	**Urban Sample (n = 300**		**Rural Sample (n = 300)**	
	Yes responses	Probability[b]	Yes responses	Probability[b]
500.00	28 (9.3) [a]	0.06	-	-
250.00	16 (5.3)	0.01	20 (6.7)[a]	0.08
100.00	106 (35.3)	0.21	30 (10.0)	0.12
50.00	60 (21.3)	0.23	40 (13.3)	0.16
25.00	56 (18.7)	0.39	46 (15.3)	0.18
10.00	-	-	108 (36.0)	0.44
Total 'yes' responses	266 (88.7)	0.89	244 (81.3)	0.81
Protest responses	34 (11.30	0.11	56 (18.7)	0.19

a: percentage of total number of respondents in the sample.
b: $P_i /(1 - P_I)$, free estimate of the probability of a yes response [P_i = *Probability of yes*].

The frequency distribution of the 'yes' responses, however, shows that respondents in the rural sample were sensitive to the bid value offered along with payment principle questions. Moreover, the free-estimated probabilities to the 'yes' responses increased from 0.08 to 0.44 as the bid value offered decreased from Rs. 250 to Rs.10. About 81% of the respondents in the rural sample answered positively to the payment principle questions. Our logit analyses of the responses found that higher levels of education, income, age, and non-consumptive use value of elephants were common factors positively influencing the respondents' responses for the WTP elicitation question both in urban and rural sample. Several non-common factors were also found in relation to the respondents' responses to the WTP elicitation question between these two samples. Factors such as the extent and value of crop damage caused by elephants were significant in the case of the rural sample. Urban respondents' responses were positively associated with their pro-conservation perceptions.

8. Should Farmers be Compensated for the Crop and Property Damage Caused by Elephants?

In the present study, the urban respondents were asked whether they thought that farmers should be compensated for the crop and property damage caused by elephants. The responses were recorded as 'Yes' (coded as 1), 'No' (coded as 0). For those who responded positively, there was a follow-up question: *Who do you think should contribute to raise funds to compensate farmers?* Several groups were identified as the possible contributors from the pilot survey of this study. The list of potential contributors were presented along with the other information to respondents in order to obtain respondents' ranking in descending order of those who should contribute funds.

A total of 82% of respondents in the urban sample were in favour of compensating farmers for the crop and property damage caused by the elephant. The relative frequency with which urban respondents suggested that different groups should pay is given in Table 7. About 70% of the urban respondents thought that city dwellers should pay. A similar percentage of respondents stated that those interested in protecting elephants should contribute. A little over 60% of the respondents thought that the tourist industry should pay. About 58% suggested that the private sector ought to contribute whereas 33% said that it is the government's responsibility to pay compensation to the farmers for the damages caused by elephants. Only 10% of respondents thought that the burden should fall completely on high-income earners in the country.

Table 7: Respondents' ranking of the major contributors of farmer Compensation (n = 300)

Major contributors	Respondents' ranking of the contributors	% of total number of respondents who positively responded
All city dwellers	1	70.5
Those who are interested in elephants	2	68.5
Tourist industry	3	61.5
The private sector	4	58.0
The government	5	33.0
Only high-income earners in the country	6	10.0

Observe that the categories of groups or entities mentioned in Table 7 are not mutually exclusive. From Table 7 it can be seen that there is strong urban support in this representative sample for the payment of compensation to farmers for damage caused by elephants. Entities or groups other than the government are more frequently suggested as sources of funds.

9. Concluding Remarks

This paper began by providing a brief outline of the human elephant conflict in Sri Lanka. An analysis of stakeholder perceptions and the problems encountered in distinguishing the status of the wild elephant as a pest or an asset. The empirical analysis presented in this paper explored urban and rural people's attitudes towards the conservation of nature in general and of the elephant in particular in Sri Lanka. It was found that the majority of the respondents in both samples have positive attitudes towards environmental conservation in general. However, some urban and rural differences emerged in the responses about elephant conservation.

The majority of respondents interviewed in the urban sample were in favour of elephant conservation. However, about 87.5 % of respondents in the rural sample accepted the propositions proposed by statements C and D, that is (C) a reduction of current elephant population by 50% to provide, respectively, more land for agriculture; and (B), the provision of more freedom for farmers to undertake elephant control measures to protect their crops. The responses received for the other statements (A, B and E) involving elephants provide a somewhat different picture about farmers' attitudes towards elephant conservation. About 75 % of rural respondents expressed their positive support for these statements favouring conservation of elephants. Therefore, it may not be correct to interpret the responses received for statements C and D as implying that that farmers are totally against conserving elephants in the country because these opinions were based on their particular situation involving land scarcity and inadequate compensation for crop and property damage caused by elephant. Most importantly, this sample of farmers was drawn from villages selected on the basis that damage by elephants to crops is severe. Therefore, it is noteworthy that these farmers, on the whole, still supported the conservation of elephants in the wild.

Because our rural samples consist of farmers in villages suffering severe crop damage from elephant raids, it is safe to assume that the level of rural support for conservation of elephants in Sri Lanka is higher than for our rural sample. One would expect farmers in areas free of elephants, or relatively free of them, to be more supportive of the conservation of elephants. But this hypothesis has yet to be tested.

While there is widespread support for the separate facilities approach to the conservation of elephants, it does not seem to be a long-term solution in Sri Lanka.

Existing protected areas are inadequate in size to ensure the long-term survival of wild elephants if elephants are confirmed to these areas, as there is little or no prospect of a significant increase in their size in Sri Lanka (Bandara and Tisdell, 2002). Thus the survival of elephants seems to depend on their use of both protected areas and non-protected areas. Socially acceptable strategies for an appropriate level of co-existence between farmers and elephants are needed. Such co-existence hinges on greater compensation for farmers to tolerate elephants to a greater extent than currently. A case exists for this compensation being financed by those who regard the elephants as an asset.

From the separate facilities option presented to respondents, it seems that urban residents are willing to pay a large sum in total to ensure the continuing survival of wild elephants in Sir Lanka. If these funds can be realized and used to improve compensation schemes for farmers and address other management issues involving elephants, they will increase the prospects for the long-term survival of the wild elephant in Sri Lanka. It is encouraging that most urban residents favour the principle that net beneficiaries from the protection of elephants (urban dwellers, tourist operators and so on) should contribute funds for payment of this compensation.

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