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RAPID ASSESSMENT OF HUMAN-ELEPHANT CONFLICTS AT HANDAPANAGALA AREA AND RECOMMENDATIONS FOR MINIMIZING THEM

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ABSTRACT

At present during the dry season (July to September), there are about 120-150 elephants all using the water resources and refuge available in the Anapallama teak forest. Experience during the last few years indicates that these animals comprise several clans and families forming one large herd during the dry season, which breaks up into original clans and families which then travel to other areas in search of food during the rainy season. However, a resident herd of about 30 to 40 animals remains in the near vicinity of the Handapanagala tank. The incidence of crop raiding is highest during the dry season and involves whatever crops are being cultivated by the villages. There have been a number of incidents where elephant calves have died due to falling into pits or unprotected wells. In some incidents the villages have killed the animals by poisoning.

The objectives of the study include: to suggest remedial measures to reduce the Human - Elephant conflict and to suggest short term and long term conservation strategies to reduce the conflicts to a minimum.

The methodology includes: data collected on socio-economic and agricultural practices of the farmers; gathering information regarding the elephant movement and conflict; estimations of the carrying capacity of water holes in Yala blocks III and IV; visual assessment of available foliage in Yala blocks III and IV; and examination of migratory paths from Handapanagala to Yala blocks V and IV.

Short term recommendations include: capture and translocate a few habitual crop raiders; open a corridor linking Handapangala area and Yala National Park; translocate Neluwagala settlers; provide adequate space for animals; repair and reconstruct water holes in Yala blocks III and IV.

Long term recommendations include: a study to determine the carrying capacity of Yala blocks III and IV; enrichment of the habitat in Yala blocks III IV and V; establishment of a research unit in situ to study migratory patterns; carry out a study to determine the social, economical and environmental viability of Sugar cane plantations.

INTRODUCTION

At present during the dry season (July to September) there are about 120 - 150 elephants all using the water available in the Handapanagala Tank and taking refuge in the teak forest. Experience during the last few years indicates that these animals comprise several clans and families forming one large herd during the dry season which together share the common resource of water in the tank. The absence of a large number of elephants during the rainy season suggests that, since water is not a problem, this large herd breaks up into its original clans and families which move to other areas in search of food. However, a resident herd of about 30 - 40 animals remains in the near vicinity of the Neluwagala village taking refuge in the teak forest.

During dry seasons over the past years, due to over grazing by large herds, the carrying capacity of the teak forest is exceeded and this forest is also under threat since there is sever de-barking and even up-rooting of trees. The incidence of crop raiding is highest during the dry season and includes whatever crops are cultivated by the villagers. Acute scarcity of food sometimes forces the matriarchs to bring young calves into human settlement areas knowing the risks that they might face. This type of crop raiding was apparent in Neluwagala and Pubudugama and part of Buduruwagala villages.

There have been a number of incidents where calves have received gun shot injuries and some have died by falling into pits or unprotected wells and in some instances there have been cases of sudden death following acute diarrhoea which is suggests poisoning.

The farmers used traditional methods of making noises, lighting crackers and fires and using hurricane lamps to discourage the elephants from raiding their crops. It was noted that animals become conditioned to these practices with time and are sometimes bold enough to charge the farmers using them.

OBJECTIVES OF THE STUDY

This study had the following two main objectives

- To suggest remedial measures for reducing the Human - Elephant conflict, so that elephants are not subject to harassment by the villagers and humans are not at risk.
- To suggest long term conservation strategies to be adopted in this area, so that conflicts can be reduced to a minimum.

METHODOLOGY

The following methodology was applied in this study.

- To asses the present crisis, data was collected on socio-economic and agricultural practices of the farmers. All Grama Niladaries (GN) and selected village leaders were interviewed and data collected using a purpose made questionnaire
- Information regarding the elephants was collected using a separate questionnaire. Information was also gathered through game rangers, game guards, GN and past reports from the Department of Wildlife Conservation (DWLC).
- Carrying capacity of the water holes in Yala National Park blocks III and IV were monitored for the months May to September 1994.
- Visual assessment of available foliage was done in Yala Blocks III and IV.
- Migratory paths used by the animals over the last few years (before Pelawatta Sugar Industry (PSI)) were determined by following tracks on foot from Handapanagala to Yala Blocks V and IV.

RESULTS

Socio - Economic and Agricultural practices :-

Two to six village leaders from each of 14 grama niladaries were interviewed (total 54) and data collected on the following:

- Demography of the study area
- Income levels of the villagers
- Occupational statuses
- Cropping patterns
- The extent of crop damage
- Protective measures adopted by the farmers
- The extent of Property Damage
- Pattern of Manslaughter (over the past 5 Years)
- Suggestions of the public in the study area.

Figure 1 shows a Location Map of the Study Area.

Based on the interviews with the village leaders and the Grama niladharies, the following were identified as the areas severely affected by the Handapanagala herd especially during the dry season:

- Randenigodayaya (Part)
- Pubuduwewa
- Buduruwagala east (Wadinahelayaya)
- Anapallama
- Handapanagala
- Neluwagala

The following areas were not affected by the Handapanagala elephants - but occasionally affected by other elephants:

- Randenigodayaya (part)
- Tellulla
- Tellulla Janapadaya
- Nugayaya
- Sudupanawela.
- Ehiliwewa
- Mahaaragama
- Andawelayaya
- Warunagama

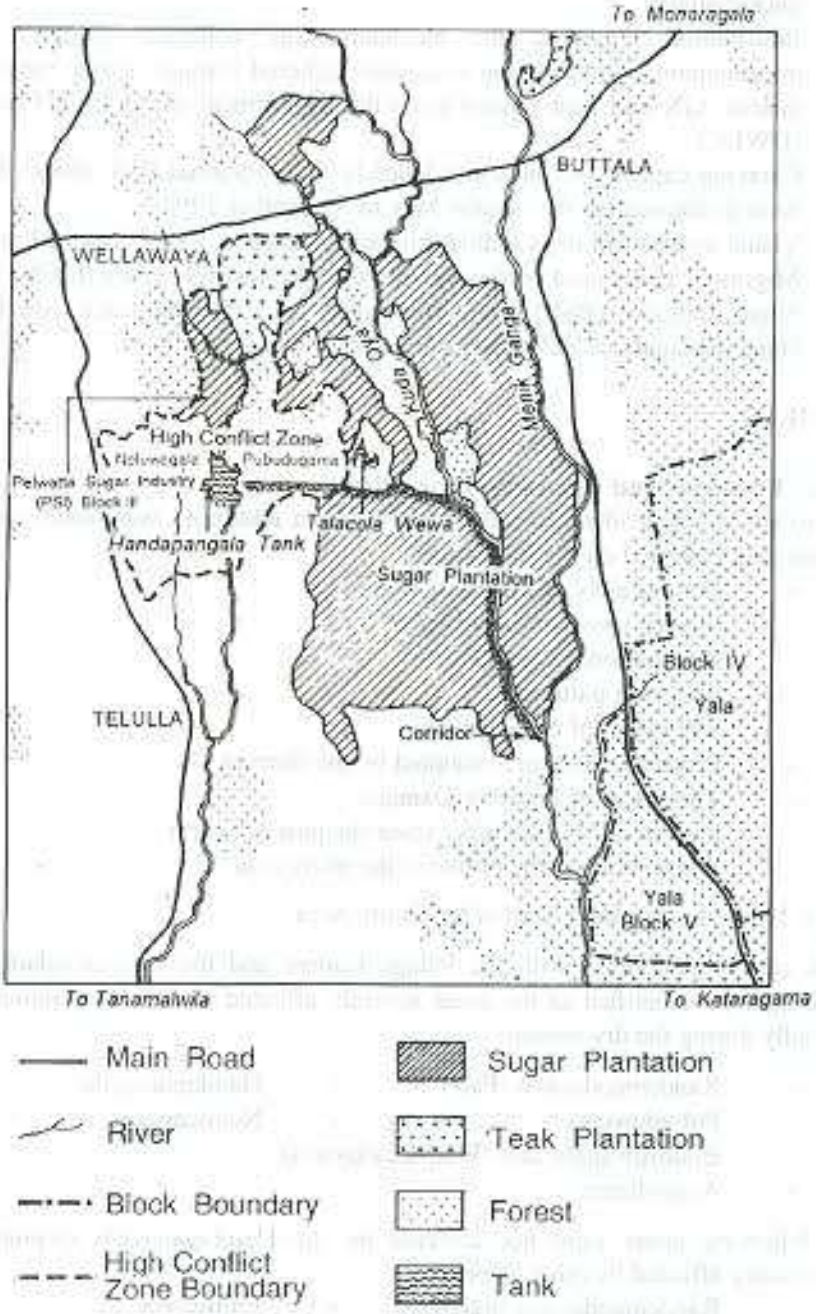

Figure 1 - Location Map of the Handapanagala Area.

DEMOGRAPHY

The total human population in the study area was 27,900. The total study area could be sub-divided in to two zones namely:

- Severely affected area and
- less affected area

In the less affected area, the problems were the normal elephant problems found even before the establishment of the Pelwatte Sugar Industry. See Figure 2.

Severely affected area

In the severely affected area the total population was 12,343 comprising 2173 family units (3469 adult males over 20 years, 3856 adult females, 5018 children).

Less affected area :-

In this area the population was about 17,357 comprising 3567 family units (3891 adult males, 4116 females, 7550 children).

INCOME LEVELS

In the total study area 95.5% of all the families had annual incomes of less than Rs. 50,000. This percentage is true for both severely affected and less affected areas, but the only significant difference was that in the severely affected area almost all families were food stamp holders or Janasaviya beneficiaries, whereas in the less affected area 97% are dependents of food stamps and Janasaviya and the remaining 3% were self sufficient with annual incomes of more than Rs. 75,000. See Table 1 and Figure 3.

Table 1 Family Incomes in the Severely Affected and Less Affected Areas

Income Groups (Annual Income)	No. Families in the Severely Affected Areas	No. Families in the Less Affected Areas
1. More than >Rs.100,000	2	24
2. >Rs.75,000 & < Rs.100,000	8	116
3. >Rs.50,000 & < Rs. 75,000	87	23
4. Less than Rs. 50,000	2076	3404
5. Food Stamps holders	1368	2113
6. Janasaviya Families	832	1460
TOTAL	2173	3567

OCCUPATIONAL STATUS

From the data collected it became apparent that 66.6% were farmers. However, the worst affected area showed a positive trend of people deviating from their normal cropping practices by selecting other crops such as tobacco, ground nuts etc. which were the crops disliked by the elephants. The number of farmers engaged in Tobacco cultivation in the affected area was 18.4% compared to 7.3% in the less affected

area. In severely affected areas people were keen to engage in other types of employment (other than farming), such as Government employment, daily labour work, owning rice mills and acting as tourist guides. This sort of deviation from their normal livelihood may be due to the prevailing conditions in the affected area arising from human - elephant conflicts. See Table 2 and Figure 4.

Table 2 Occupational Status in the Severely Affected and Less Affected Areas

Description	Severely Affected Area. No.	Area %	Less Affected Area. No.	Area %
1. Government servants	227	5.8	350	5.3
2. Farmers (paddy)	688	17.8	907	13.8
3. Farmers (Tobacco)	730	18.4	480	7.3
4. Farmers (other crop)	1142	28.7	3070	46.8
5. Labourers (sugar company)	842	21.3	1678	25.5
6. Rice mill owners	340	8.6	74	1.1
7. Tourist Guides	5	.1	1	-

CROPPING PATTERNS

There was a significant difference in the type of cultivation that the farmers practice in the two zones. As mentioned earlier, in the problem areas farmers try to cultivate crops which are disliked by the elephants, such as Tobacco, Chilies and Ground nuts. However, with great difficulty, the cultivation of paddy has continued. In contrast, in the less affected areas the popular and highly profitable crops such as paddy, sugar cane, onions and bananas, were cultivated by the farmers. In addition, vegetables, coconut and manioc were cultivated by all farmers mainly for their own consumption (not for sale). Figure 5 shows traditional cropping patterns.

INCOME GENERATED BY DIFFERENT CROPPING PATTERNS

When comparing the income per acre generated by the farmers' different cropping patterns for two zones (severely and less affected areas), the graph clearly indicates that in the severely affected area, the income generated by paddy, ground nuts, sugar cane, bananas, onions and vegetable farming has dropped significantly compared to income in the less affected zone. The only crops that have generated higher profits in the affected area were tobacco, chilies, manioc, and kurakkan, which are disliked by the elephants. From Figure 6 it can be seen that the most profitable crops were sugar cane, onions and vegetables, which could not be cultivated in the severely affected area due to elephant depredation.

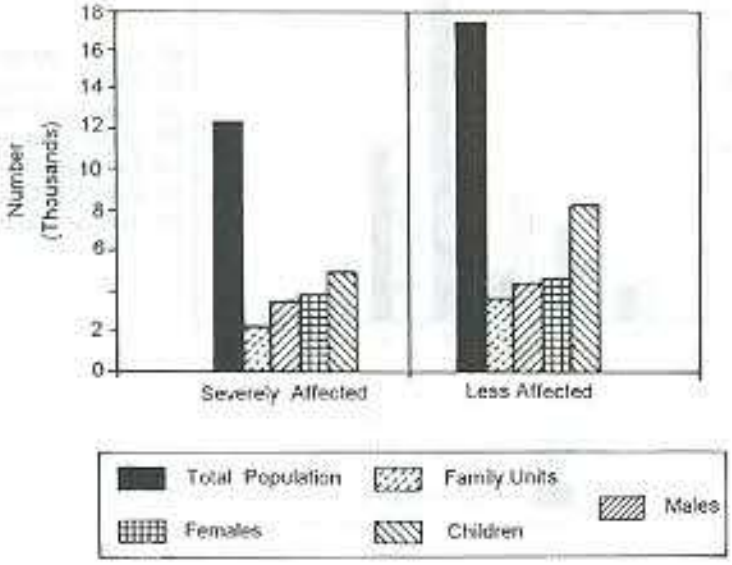

Figure 2 - Demographic data of the conflict area

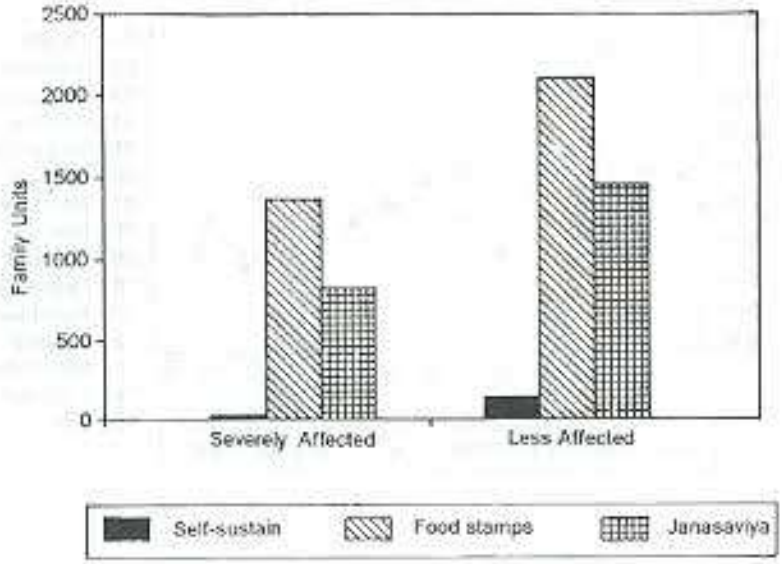

Figure 3 - Comparison of Income levels of people living in the severely affected area and the less affected area

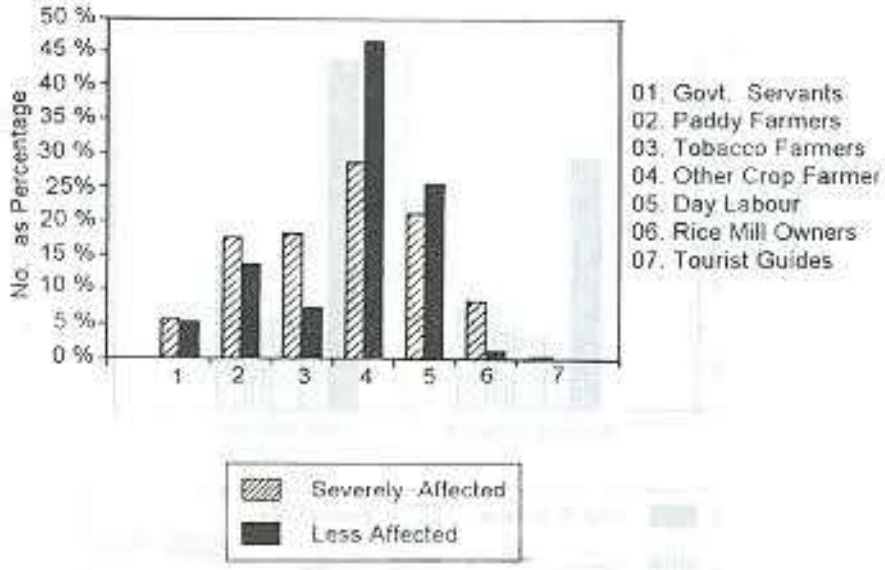

Figure 4 - Occupation Status of the People living in the conflict area

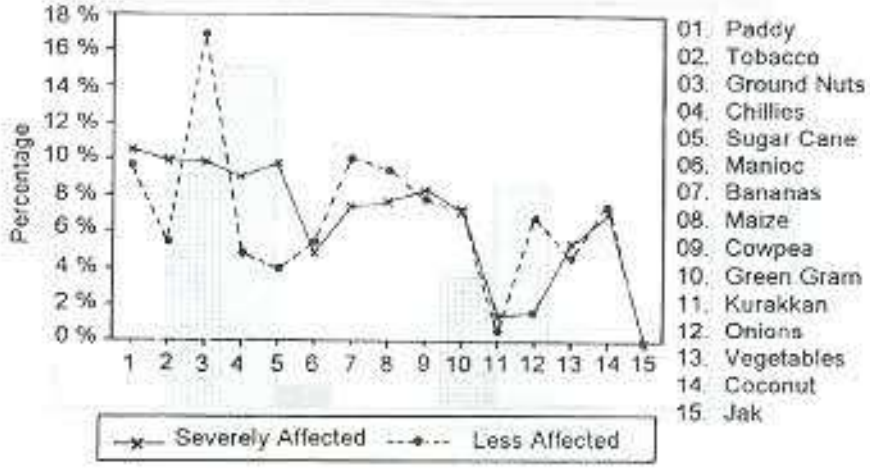

Figure 5 - Farmers Traditional Cropping Patterns: comparison of Severely Affected area and the Less Affected area

CROP DAMAGE AND INCOME LOSS DURING THE YEAR 1993

In the severely affected area more than 380 acres of sugar cane (28% of the total extent planted) had been damaged by the elephants causing a loss of more than Rs. 8 million during the year 1993. The damage done to the maize cultivation in this area was nearly Rs. 1.2 million. However, no damage has been reported for tobacco, while minimal damage has been reported from chili areas (mechanical in nature). This shows the reason why farmers in the affected area select crops such as tobacco and chilies rather that selecting the highly profitable crops such as sugar cane, onion and vegetables. Villages growing tobacco complained of the ill effects of this crop due to the extensive use of pesticides. The children as well as adults were often confronted with respiratory tract infections and asthma. However, they opted to grow this crop since it was least affected by the elephants. Furthermore, the resulting soil erosion in these areas (especially in Neluwagala) may lead to silting of the Handapanagala tank in the future. See Figure 7 which shows elephant damage for several crops by area.

INCOME LOSS IN 1993

Figure 8 illustrates the losses in monetary terms due to crop damage in the two zones caused by elephant depredation and Table 3 gives the extent of the losses for various crops.

PROTECTIVE MEASURES ADOPTED BY THE FARMERS

The protective measures adopted by the farmers to discourage elephants from crop depredation included almost all of the methods mentioned in the introduction. Other important methods include the use of trenches and electric fences. Electric fences were utilized by the Pelwatte Sugar Industries. However, to the villagers, these are not cost effective. Electric fences erected by the Pelwatte Sugar Industries have forced the elephants to move towards the villages or farm gardens and paddy fields. The use of trenches was also not practicable because of the heavy rains during the wet season. In the severely affected area most of the farmers practised lighting of crackers, lighting of fires and making noises to prevent elephant entering their cropping area. However, with time, these animals became conditioned to these methods and sometimes were even bold enough to charge at the farmers using them. In several instances animals have damaged houses from which the farmers light crackers. However, lighting of hurricane lanterns in the fields seems to be the most effective method of discouraging elephants entering cultivated land. See Figure 9 which illustrates the protective measures adopted by farmers.

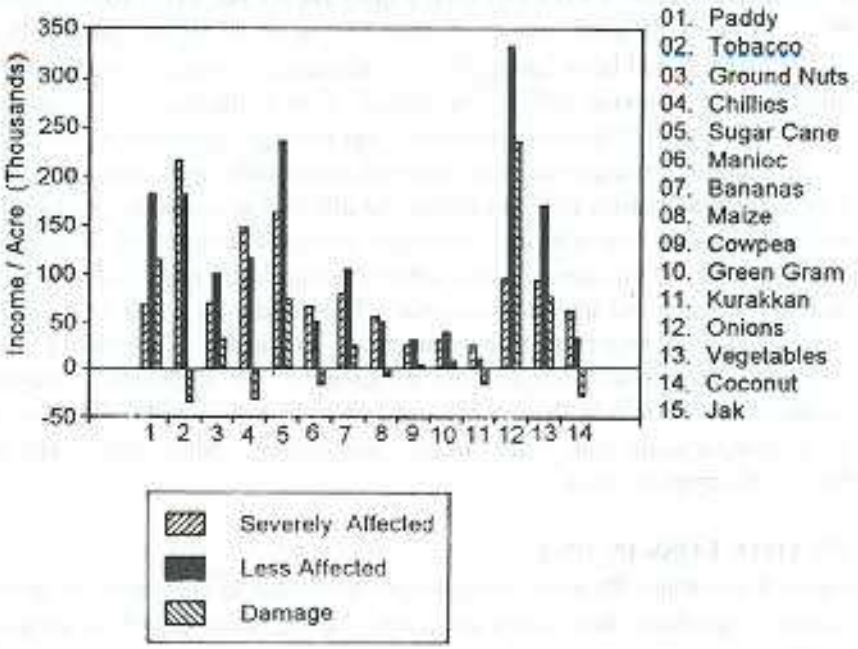

Figure 6 - Farmer per acre income comparison in the Severely Affected area to the Less Affected area

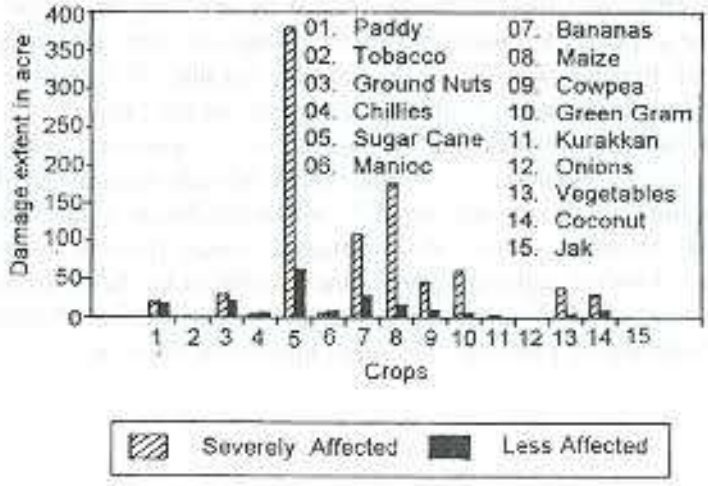

Figure 7 - Damage by Elephants in the Severely Affected area and the Less Affected area

Table 3 Extent of Loss for various Crops

Main crop	Damaged extent (acres) Affected area	Damaged extent (acres) Less affected area	Value loss Rs. Affected Area	Value loss Rs. Less affected area
1. paddy	21	18	213,500	73,000
2. Tobacco	0	0	0	0
3.Ground nuts	31	22	309,000	170,000
4. Chilies	.5	5	3,000	3,500
5. Sugar cane	380	65	8,330,000	720,000
6. Manioc	6	10	42,000	20,000
7. Banana	110	30	653,000	258,000
8. Maize	178	17	1,192,000	34,000
9. Cowpea	47	10	151,560	15,000
10.Green Gram	64	5	216,000	15,000
11.Kurakkan	2	0	4,000	0
12.Onions	0	0	0	0
13.Vegetables	40	4	160,000	20,000
14.Coconut	32	10.5	567,600	3,500
15.Jak	0	0	0	0
All	911.5	196.5	11,866,660	1,383,500

PROPERTY DAMAGE

As the graph in Figure 10 indicates, some degree of property damage has been caused by elephants, to almost every house or property in the study area. However, the extent of damage was significantly higher in the severely affected area. In most cases the rear portions of the houses (kitchens) where grain is usually stored was the most susceptible to damage.

In most instances the 'rogues' were males and were positively identified. Male loners, 'Thapparaya', 'Beeri Aliya', and 'Kabaraya' and two females 'Nangi' and 'Anti' are among the well known destroyers of property. 'Thapparaya' has destroyed more than 20 houses in the Pubuduwewa area and during the last two years more than 125 houses, including 20 temporary huts, were damaged.

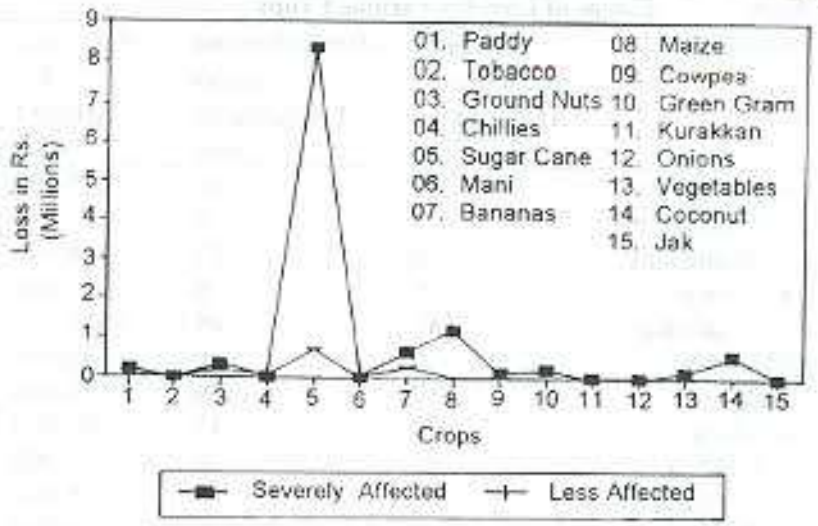

Figure 8 - Income loss due to damage separately for Severely Affected area and Less Affected area

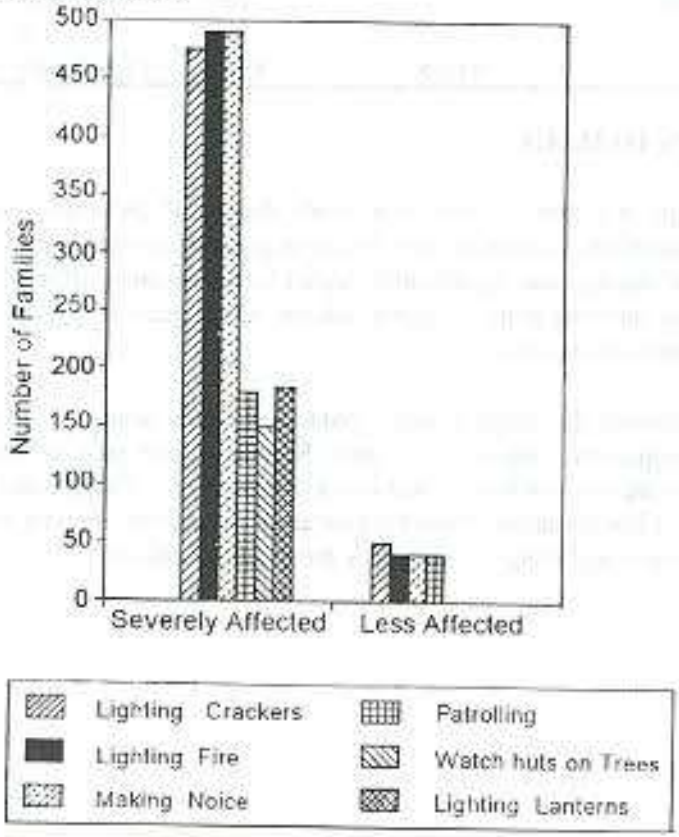

Figure 9 - Comparison of Protective measures adopted by the farmers in Severely Affected area and Less Affected area

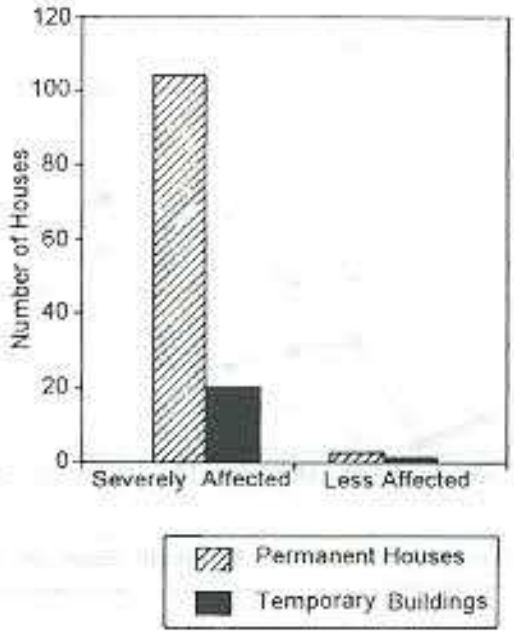

Figure 10 - Comparison of Property damage by Elephants in Severely Affected area and Less Affected area

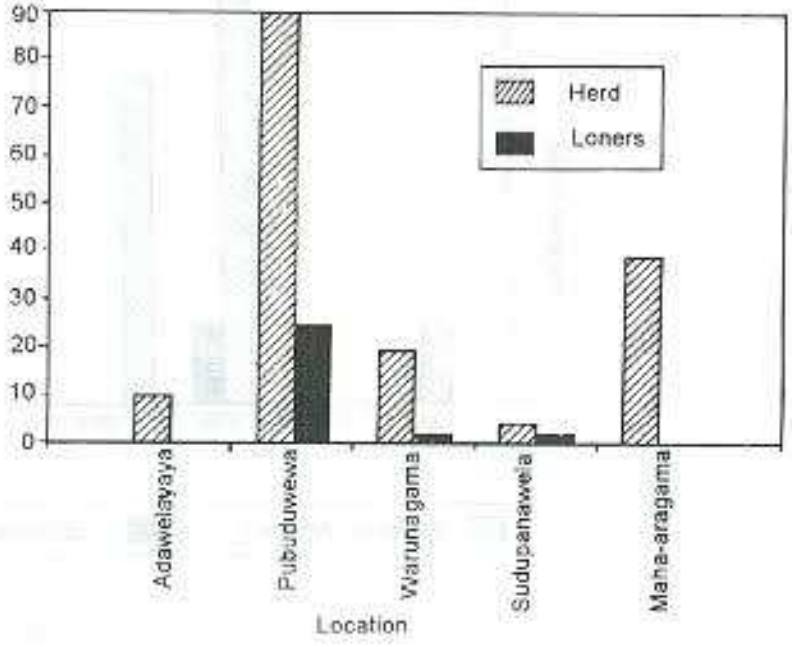

Figure 11 - Different herds of Elephants seen in Handapanagala area

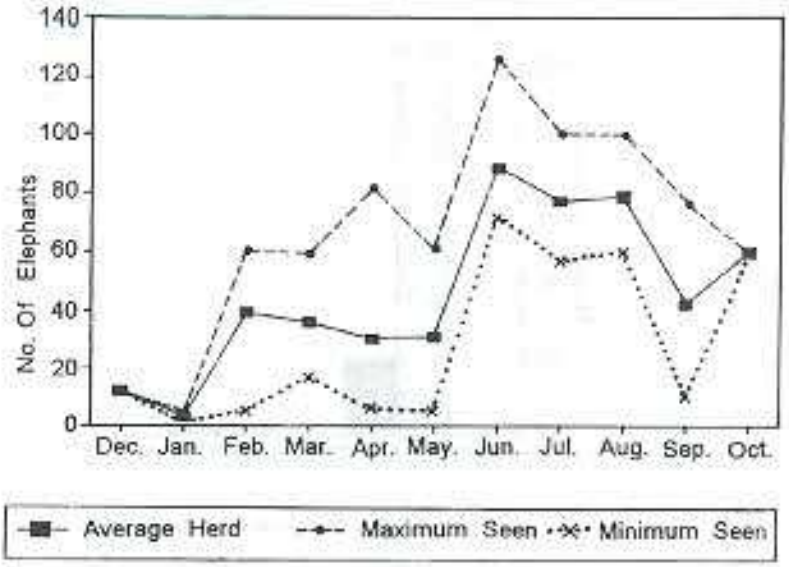

Figure 12 - Time Series Pattern of Handapanagala collective Elephant herd structure

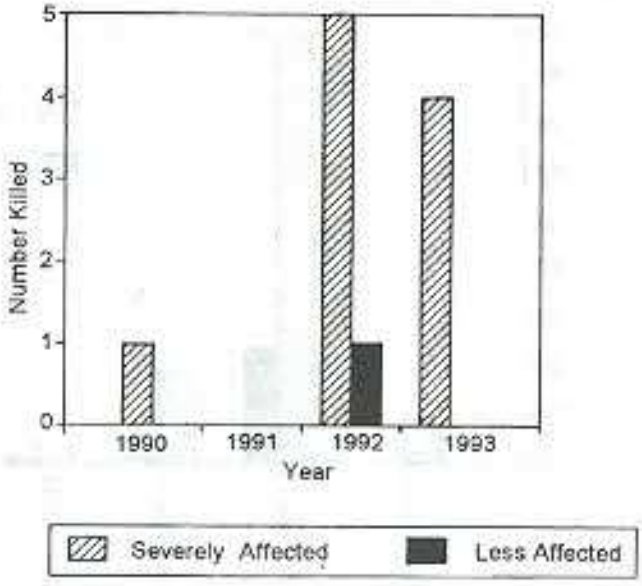

Figure 13 - Elephants killed in the Hadapanagala area during the period year 1990 - 1993

ELEPHANT POPULATION

According to the available data with the wildlife Range office, several herds were identified in the study area in different locations. In Andawelayaya a herd of 10 animals, in Pubuduwewa a herd of 90 animals, in Warunagama a herd of 20 animals, in Sudupanawewa another 5 animals and in Maha-aragama a herd of 40 elephants were observed (see Figure 11). However, as mentioned in the introduction, the Handapanagala herd is comprised of several clans and families forming one large herd during the dry season which uses the common water resources available in the Handapanagala tank.

The graph in Figure 12 indicates that during June, July and August, the Handapanagala herd rises in number to a maximum of between 150 and 170 elephants (the minimum is about 80 animals). The number falls gradually thereafter during the rainy season. When water is not problem in this area, very few animals remain in the vicinity of the Handapanagala tank. However, there is a herd of about 20 to 40 animals permanently in the near vicinity of the Neluwagala village taking refuge in the Teak forest throughout the year.

ELEPHANTS KILLED

The results illustrated in Figure 13 show that 11 animals were found dead during the last four years in the study area due to gunshot injuries - of these, 5 animals were from Pubuduwewa village where the conflict was most intense. In addition, 2 animals were found dead in Neluwagala Colony which is also within the high conflict zone. At Neluwagala one animal was found dead with gunshot injuries. In Maha-aragama one animal was found dead due to poisoning.

However, experience suggests that the mortality rate is very much higher than the records show. After the completion of this study the 'Thanidallaya' was found dead due to gunshot injuries near "Valliammara" in Yala Block 5.

ELEPHANTS WOUNDED

Many elephants having huge abscesses, possibly caused by bullet wounds, have been observed by game guards. Most of the wounded animals were males aged between 20 and 40 years.

IDENTIFIED ELEPHANTS IN THE CONFLICT AREA

During the survey in the Handapanagala area, animals were identified from descriptions given by the villagers. They were responsible for most of the property damage and manslaughter.

male loners:

- Kabaraya
- Thapparaya
- Thanidalaya (Now reported dead)
- Beeri Aliya

females:

- Nangi
- Anti

CARRYING CAPACITY OF WATER HOLES IN YALA BLOCKS III & IV

Except for 'Ehala suwadan Ara' most of the water resources in Yala blocks III and IV dry up during the dry season. Ehala Sundan ara has a natural catchment with an estimated water holding capacity of about 400,000 cubic meters, which is also partly covered with Salvinia. 'Pahala Sundan ara could be made into one of the best water resources in this block. It is fed by two major aras and its total capacity could be about 800,000 cubic meters. See Table 4.

MIGRATORY PATHS USED BY THE ANIMALS

Migratory routes were determined by following the paths used by the animals over the last few years. There is evidence that the animals have passed through Demodara to Yala Block V then to Blocks III and IV. This path has been disturbed by the Pelwatte Sugar Plantation. An electrified fence line has also been placed across this path. However, Handapanagala could be linked to Demodara through 'Kuda Oya', and then to Yala Block V and subsequently to Yala Blocks III and IV. See Figure 1 (Page 202).

Table 4 The major water holes found in the Yala Blocks IV and III.

Water Hole	Capacity m^3
Yala Block IV.	
1. Ehala Suwadan Ara	400,000
2. Kiriwedduwa tank	5,000
3. Medapata hole	100
4. Palugaswewa	500
5. Kohombapalassa	100,000
6. Metapata hole II	100
7. Kibulagala hole	10
8. Pahala Suwandan Ara	800,000
9. Water Hole	35
Yala Block III	
1. Talakolawewa	50,000
2. Uraluwewa	75,000
3. Malwariya	300,000
Yala Block V	
1. Indiwella tank	300,000

CONCLUSIONS

The main livelihood of the people living in the Handapanagala area was farming. The villagers admit that there were elephants in the past, before the establishment of Pelwatte Sugar Industry. At that time the people and animals lived in harmony in this area without major conflicts. Enough space for both was available and the elephants were not restricted to the Handapanagala area - they were able to migrate

to other areas such as Yala, Gal Oya, Udawalawe and Lahugala using natural jungle corridors. The the farmers could easily scare them off to protect their crops. There was sufficient food for the animals since the jungle cover was far more extensive. The main crops planted during the early days were paddy, chilies, maize, ground nuts and other grains such as kurakkan. In addition, farmers used to grow coconut, jak and plantain trees in their home gardens - these were mainly for their own consumption. Today, in the severely affected area, only mature coconut trees which are 20 to 30 years old survive. Young plants are not to be seen and farmers have given up hope of establishing them, since they will be destroyed by raiding elephants.

In the severely affected area the farmers have taken up to growing cash crops which are not eaten by elephants. Tobacco cultivation is one of these. This creates health problems among cultivators. Even with such problems, they are compelled to grow tobacco since it is one crop that grows well in this region and is disliked by the elephants.

Animal husbandry is practised on a minor scale in Handapanagala area. There are no individual grazing lands and no communal grazing land is available for domesticated livestock. Surprisingly, there were only a few incidents of domestic livestock being harmed by wild elephants.

Compared to the less affected area, the socio-economic data suggests that the villagers in the severely affected area are marginal farmers fighting very hard to make ends meet. Nearly 98% of the population is dependent on food stamps and Janasaviya benefits. Results of this study suggest that one cannot expect any sympathy for elephants if a quick solution is not found to resolve this conflict. This is becoming more evident from the fact that farmers are resorting to more sophisticated means of destroying the common enemy (elephants) by poisoning.

With many more wounded elephants, animosity will increase should animals resort to manslaughter when in direct confrontation. If this occurs unchecked it could give rise to a large number of habitual killers - making the situation even worse.

It is clear that the conflict has arisen because of the high density of elephants per unit area in the severely affected area. This is mainly seen in the dry season when elephants and humans congregate for the common water resource at the Handapanagala Tank. It is concluded that any conservation strategy adopted which puts more burden on the poorest of the poor will never succeeding this area.

Immediate study needs to be started to determine the carrying capacities of Yala Blocks IV and III. Although visual assessments suggests that there is enough foliage for elephants, such a study will help in the future management of the area. Both blocks IV and III have closed canopy forest which affects the undergrowth of the area. Therefore careful planning is essential before embarking on a project for the enrichment of the habitat in these areas. Sometimes, thinning of the forest may have

to be undertaken if it is environmentally sound and no ecological disturbances are created.

Such a study should also provide guidelines for to the enrichment of the habitat (pasture and fodder) in Yala Blocks III, IV and V.

RECOMMENDATIONS

The following recommendations are made:

Short term

-Capture and translocate the habitual killers and crop raiders to reduce the socio-political pressure. Attempts should be made to track them using Radio-Telemetry following translocation.

-Open a corridor linking Handapanagala area and Yala national park. The proposed corridor is through Demodara to Yala Block V and Block IV. This has to be followed up with studies to determine whether the corridor should be temporary or permanent and to evaluate movement patterns of the animals.

-Translocate Neluwagala settlers about 80 to 90 families in a suitable new area.

-Provide adequate space for animals. Readjustment of the boundaries of (PSI) and release of Pelwatte Block 3 sugar area for animals.

-Repair and reconstruct the identified and most viable water holes in Yala Blocks III and IV.

-Realistic approach should be made to adopt an Insurance scheme for payment of compensation for crop depredation and loss of human life.

Long Term

-Carry out a study to determine carrying capacity of Yala Blocks III and IV in order to accommodate more animals in this area.

-Enrichment of the habitat in Yala Blocks III, IV and V especially for grazing land.

-Establish a research unit to study behaviour and movement patterns of elephants in the region.

-Carry out a study to determine social economical and environmental viability of having Sugar cane plantation compared of Yala national Park.

-Establish conflict resolving committees in the affected areas to determine crop and property damage for payment of compensation.

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ECOTOURISM AND CONSERVATION OF NATURAL AREAS IN THE SOUTH EAST DRY ZONE OF SRI LANKA

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ABSTRACT

Areas dominated by natural vegetation, wildlife, or forest are referred to as natural areas. Ecotourism is undertaken in largely undisturbed natural areas with a view to study, admire, and enjoy the scenery and wild plants and animals as well as any existing cultural manifestations. Tourism in the South East Dry Zone (SEDZ) of Sri Lanka has been developed in an ad-hoc manner which has resulted in adverse impacts on specific attractive sites, natural vegetation and wildlife as well as on local communities.

The objective of this paper is to assess the potential for ecotourism in the context of conservation and proper management of natural areas in the SEDZ. It is based on the work carried out as a part of a broader study on Natural Area Conservation in SEDZ under UNDP sponsorship for the Regional Development Division of the Ministry of Policy Planning & Implementation.

While promoting ecotourism in this region, tourism activities should be viewed as a means of generating revenue to enhance conservation efforts. In addition to a series of site specific and area specific proposals, the need for a regional tourism plan, which recognizes natural areas in SEDZ as systems, is stressed. In this regard, the coordinated effort of the Ceylon Tourist Board, the Department of Wildlife Conservation and the proposed Southern Area Development Authority is highlighted.

INTRODUCTION

There is an increasing tendency for interest to be directed towards an alternative form of tourism that apparently has emerged in response to the growing dissatisfaction with mass tourism and its associated negative impacts on host nations (Fennel and Smale, 1992). This new phenomenon, which has been broadly termed "Alternative Tourism" or "Ecotourism", has evolved as a popular response to the emphasis on consumerism and the exploitation associated with mass tourism especially in developing nations (Cohen, 1987).