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Impact of human – Elephant conflict on livelihood: A case study from a rural setting of Sri Lanka

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Abstract

Impact of wild animals on livelihood of rural population in Sri Lanka takes a higher value. Wild elephants cause maximum damage to rural livelihood in Sri Lanka compared to other wild animals. A huge impact towards human – elephant co-existence started in mid century. When the dry zone forests became human settlements elephants lost their habitat. It became a common feature for elephants who lost their habitat to come to villages. During last five decades, the populations in Sri Lanka increased by three folds while forests were reduced by half of its original status. The most limiting factor was the congregation of elephants due to division of forests into small plots. People started using even elephant corridors. In this Research attention is been drawn to if there is any similarity or disparity in the in vade of wild elephants, and if there is any difference in the number during different various stages of the harvest. Impact of Wild elephants towards rural livelihood need to be considered, there is a very less possibility to prevent damages caused to crops. Attention was paid to issues created in connection to the damages which are not belong to the agricultural category caused by wild elephants. House and property damages, threats posed to human lives, mental sufferings of the farmers are some issues among them. Similarly, attention was paid to the human threats to the survival of wild animals.

Keywords: Wild animals, rural population, human – elephant

Introduction

In the world wild elephants are present in 50 countries, 13 of which are in Asia and 37 in Africa. At present the number of wild Asian elephants is between 35,000 and 50,000 (www.elephantcare.org), while the number in captivity is around 16,000. The trend in almost all Asian range states has been a drastic decline in wild elephant numbers, due to much more anthropogenic factors related to increasing human population, deforestation, degradation of habitat, fragmentation of breeding populations. Human – elephant conflicts are been reported in many parts of the country and it has reached its peak (Thennakoon, 1996; University of Peradeniya, 2005) ^[10, 11]. Researchers have shown 160 elephants and 60 people die each year due to human – elephant conflicts, University of Peradeniya, 2010) ^[11]. According to reports of the Department of Wildlife Conservation (2009 – 2010) ^[5], number of human deaths were 51 and injuries 33 from 2009 to 2010. The number of property destruction is 752. Crop, properties and human life damages done by wild elephants causes a considerable impact on the rural livelihood, economy of Sri Lanka as well as the national economy (Thennakoon, 1996; Jayawardene, 2003) ^[10, 8]. Similarly, human activities also poses a major threat to the existence of elephants. The number of elephants killed by people by shooting and death traps is also high. The number of families affected by the threat of wild elephants is around 25,000. Around 90% of these families' livelihood are based agricultural activities (Department of Wildlife Conservation, 2010) ^[5]. Indebtedness and poverty caused by the destruction of harvest by wild elephants is an obstacle to the national development (Thennakoon, 1996; Jayawardena, 2003) ^[10]. In addition, this also creates a negative impact on the education of the children in the areas where this issue exist. The human – elephant conflict has become an issue which require immediate attention. Thus, this research was conducted to find out the level of this issue exist in the *Polpithigama* divisional secretariat, causes behind the damages and the impact of human – elephant conflict on the rural economy etc.

Methodology

Polpithigama divisional secretariat in *Kurunegala* district in the North Western Province was selected as the study area. According to the pilot survey carried out in the *Polpithigama* divisional secretariat, *Dambe Grama Niladhari* division was selected as the most human - elephant conflict affected and the rural economic development disrupted area. There are 190 households live in the area and 26% of households (50) were selected as a sample. These households include whose harvest and property have been destroyed by wild elephants. Quantitative data were extracted through a questionnaire forwarded to the sample. Qualitative information was collected through formal and informal interviews with household members, leaders of farmers' associations, *Grama Niladhari* and officials of the Department of Wildlife Conservation and case studies. Proximity to each farm land, prevention measures, quantity of destruction, the connection between the number of times wild elephants invaded the farm lands and the quantity of destruction were analyzed through a statistical verification.

Results and Discussion

Impact of Wild elephants towards income generating activities

Attention is been drawn to if there is any similarity or disparity in the invade of wild elephants, and if there is any difference in the number during different various stages of the harvest. Paddy cultivation is the main source of income generating activity and livelihood strategy in the study area and 87% of households cultivate paddy crops in owned or rented or a leased land. There were a very successful paddy cultivation in an area of 167 acres. People who were in the sample category owned 68 acres of paddy land.

Coconut is another successful cultivation in the study area and it exists 68 acres. Approximately, 25% of the sample households engage in coconut cultivation. The total number of coconut trees which belongs to sample households are 1495 and the cultivation area is 20 acres. Around 14% of the surveyed households engage in banana cultivation for commercial and subsistence purposes. The total area of banana cultivation is 10 acres. Five percent of households engage in chena cultivation and a land area of 5 acres are being utilized for this purpose.

Crop damages according to cultivation stages

It was clear in the field that since 15 days from the commencement of cultivation of above crops are been destructed by wild elephants. It was possible to identify various stages of those damages is occurring. It can be categorized as 01) Vegetative Stage, 02) Reproductive Stage and 03) Fermentation Stage. Nature of destruction is how the destruction has been carried out. That is if the harvest is completely destructed or partially destructed of minimal destruction. According to the field study, incidents could be seen that wild elephants have completely and partially destructed paddy cultivation. During the survey undertaken in the study area, farmers (%) revealed following incidents.

- 01) Seeds were destructed on the very first day of planting (14%)
- 02) Crushing of tender plants during germination period (21%)
- 03) Crushing of tender plants (42%)
- 04) Crushing of mature plants and eating lentils (40%)

In addition, it is in the view of the farmers in the area, entering the thrashing floor and eating the stock is also common. According to the above figures, wild elephants have caused damages to each and every farmer in the area. Thus, it was clear that elephants have destructed the harvest at any stage of the cultivation.

When paying attention to the coconut cultivation, the main point that could be seen was coconut plants were destroyed during their germination period. Approximately 90% of the coconut plants in the area were destroyed during germination period. In addition, 30% of the farmers were affected due to felling of coconut trees by wild elephants while 10% of the farmers suffered from destruction of tender coconut plants.

Banana cultivation is another major cultivation in the study area and wild elephants have destructed it in various stages which indicated by farmers (%) as following.

- 01) Crushing of tender plants (35%)
- 02) Crushing of grown trees (43%)
- 03) Trees becoming inferior due to eating of the middle section of the banana tree (30%)

When taking destruction caused by wild animals to chena cultivation into consideration, the damage is prominent and high in rooted crops such as peanuts and beetroot which are grown during the *yala* season in the paddy fields as dry crops. The reason is that when elephants walk across the paddy fields, the crops get destroyed not even in the initial stages but also closer to the harvesting season.

Total area of cultivation and the damage caused

Extent and the percentage of the destructed land area of the above crops are been describes here. Destruction caused to paddy and chena cultivation is measured in acre while coconut and banana are measured in number of trees.

The total extent of paddy and chena cultivation belongs to 50 households in the sample is 104 acres and out of that the area being damaged by wild elephants is 68 acres (65%). It is also important to study that total area of cultivation and damage caused in coconut and banana cultivation. The total number of banana trees planted in the area is 1950 and out of that wild elephants have damaged 1476 trees (75.6%). When considering coconut cultivation, sample households belong 1500 coconut trees and out of that wild elephants have damaged 540 trees (36%).

Location of the arable lands and damages

Arable lands of the study survey can be categorized into groups such as 01) paddy lands 02) *chena* lands and 03) home gardening. The location of arable lands can be identified as; cultivated paddy and *chena* lands located close proximity to houses, water streams, *Mahadambe* tank, jungle, mid of others lands and lands located far distance from houses.

It was important to ascertain that if there is any similarity or disparity among the location of the cultivated lands in the area. There are two assumptions with regard to this.

- 01) According to the null hypothesis there is a similarity between the location of these lands.
- 02) According to the alternative assumption a difference can be seen in the location of these lands.

It is a common acceptance that if the value in the chart is lesser than the measured value, it is presented alternative hypothesis and vice versa. The measured value was 66.98 and the chart value was 12.59. Since the value in the chart is

less, it was clear that there is a significant difference in the location of these lands.

It was clear in the field study that most of paddy fields are located closer to the stream (*oya*). In contrast, home gardens are not located closer to the water stream and *chena* lands were scattered. Hence it can be prove that there is a disparity between the locations of lands in the study area. This disparity in location causes geographical differences and these spatial status can be identified in the damages to the crops too.

1. More damages were caused to the lands located closer to *Mahadambe* tank and *Pallekele* forest reserve.
2. More damages appeared in the paddy fields and *chena* lands located near the water stream (*oya*)
3. No significant damage appeared for the *chena* and paddy crops located in the middle of other paddy, *chena* lands, home gardens and village.

Hence, it is clear that location of the land and the status of the damage done to the cultivation takes a spatial form.

Distance to the cultivations lands and damages done to cultivation

Distance from house to the cultivation lands differ from each other depending on the location of the cultivation land in the study area. Cultivation lands located in a distance of 0.5 miles or more belong to the first category (maximum distance) while land located less than 0.5 miles away belong to the second category (Minimum distance).

A connection was identified between the maximum and minimum distance of the cultivation lands and the damages caused in the study area. Correlative analysis was used to calculate this. This can be explained through a mathematical correlation. Distance from home to each cultivation lands is denotes by (x) and the destruction caused is denotes by (y). It was proved that there was a positive correlation between these two variables. This means if the distance from home to the cultivation land is more, the damage is high. In this analysis if that figure is closer to $v = 1$ or -1 it is accepted that there is some kind of a correlation. Accordingly, around 1.7 can be said there is a correlation between the distance and the damage caused. Damage caused to a land situated from 0.25 miles away from home is around 30% of the total cultivated land while the damage in a paddy located from 0.5 miles distance from home is 100% of the total cultivated land. Thus, it is clear when the distance is long, the damage is high.

Relationship between preventive measures and the damages caused

Farmers in the study area use many methods to prevent damages caused by wild animals. 01) Firing crackers 02) Fire 03) Trapping guns 04) Hooting 05) Using a rope around the cultivation lands are some of the more common methods. It was revealed in the study that all these measures are not been equally used by every farmer. Correlation analysis was used to observe if there is a difference according to use of prevention methods.

Thus, it can be concluded that no matter how many methods were used to prevent damages to the cultivation, there is a very less possibility to prevent damages caused to crops. So, it was clear that there is no clear connectivity between preventive measures and the damages caused. Correlation analysis was used to examine if there is a difference in the damages caused according to the usage of preventive

methods. Preventive methods are denotes by (x) while damage denotes by (y) and the value is $v = 5.9$. Thus it can be concluded that no matter how hard the preventive methods are been used there is a very less opportunity to prevent the damages caused to cultivation. It is very clear that there is no correlation between preventive measures and cultivation damages. As the main livelihood strategy of the survey area is agriculture (87%), it is inevitable for the farmers to face numerous difficulties if more than half of their harvest is being damaged. Some of the difficulties are such;

1. Financial status of farmers become weakened
2. Further indebtedness
3. Money has to be spent on food items
4. Farmers become more and more vulnerable

It was explained earlier that there are damages caused to the cultivation in the study area and there is an interconnection through various factors. These damages differ from crop to crop and cultivation land to another. Hence to gauge the impact of the damages caused to the economical lives of farmers, it needs to be calculated them in financial value. Farmers were of the view that they are uncertain about receiving the remaining harvest after damage, because even though the remaining stock was stored in homes, elephants demolish these houses too destroying the harvest. Therefore, deficiency of income is very prominent in the study area. According to the study, it was clear that the 150 households belong to very low income level that is below LKR 6000.00 per month. The main reason behind this status of income is the damages caused by wild elephants for their main source of livelihood. Views expressed by a farmer who was surveyed have been mentioned in box 4.1.

Box 4.1

I cultivated this season in a leased paddy land. That paddy land is close to my home. I go to watch crops every day. However, this time all the budding paddy plants were destroyed. What happens is if an elephant comes and even if it does not eat the crop the paddy field becomes useless after the elephant trampled the plants. Not even a single seed can be used. So there is no choice left for us other than committing homicide. The God above is aware how hard we work to protect this plot of land. We are even scared to shout to chase away the elephants because they come towards the direction where sound comes

Source: Field Study 2011

Non-agricultural damages caused by elephants

In this, attention was paid to issues created in connection to the damages which are not belong to the agricultural category caused by wild elephants. House and property damages, threats posed to human lives, mental sufferings of the farmers are some issues among them. Information about has been explained below.

Property and house damages

In addition to the damages to cultivation, other damages caused by wild elephants were identified during the field survey conducted in the study area. A time difference could be seen in the damages done to houses and properties. Agricultural activities are practiced according to *Yala* and *Maha* seasons in the study area. Elephants cause major damages to the harvest from the very beginning to the end

of both the seasons. Once the harvesting season is over elephants enter home gardens and start to destroy the cultivation there. According to the survey there are less damages to the houses during the paddy cultivation season but has increased it after collecting the harvest. Out of the 50 households surveyed, households of 25 families (50%) were destroyed by wild elephants. Out of this, damages were caused to the 18 (61%) houses only after the harvesting season while 7 house damages were done during the cultivation period.

Damages to houses depend on couple of factors.

1. Location of houses close to elephant corridors
2. Construction condition of houses
3. Grains stored inside the house and crops in the home garden

Depending on above factors, damages caused to each house is different from one another.

1. Location of houses close to elephant corridors

There are number of special features in relation to the location of houses in the study area. 40% of the surveyed houses are located close proximity to *Mahadambe* tank. Damages caused by the wild elephants is high in this area because elephants come to the tank to drink water from the *Mahadambe* tank. There is a great possibility of having property damages if they are situated near the traditional elephant corridors.

02) Construction status of houses

Two categories could be identified according to the construction status of houses. Those are permanent and temporary houses. It was revealed during the study that in most cases the income of the people living there have affected to this. Houses constructed with wattle and daub are temporary houses while walls were built with bricks and roof is made with tile, asbestos or iron sheets are permanent houses. Approximately, 90% of houses in the study area are temporary houses while only 10% are permanent houses. It was a view of the villagers that an elephant bump is enough for the collapse of a temporary house. Similarly, elephants can easily break the temporary houses than permanent ones. Hence, the amount of destruction is been decided on the status of the construction of a house.

Property damages done by wild elephants can be categorized as; wall cracks/ collapse, rood breakages, door and window breakages, damages caused to paddy stored inside houses and grill breakages. The percentages of door and window breakage is 17.8% while grill breakage is 11.5%. Furniture were destroyed in 8.3% of households.

03) Grains stored inside houses and preferable crops grown in home gardens

Another main reason for the house and property destruction is the storage of grains inside houses and crops grown in home gardens. Most of the dwellers whose houses were destroyed said the elephants broke into their houses to eat grains stored inside these house. It was revealed that 80% of the temporary houses were broken by the elephants who came seeking food stored inside. Villagers were of the view that storing grains inside houses is similar to an open invitation to wild elephants.

Similarly, there is an impact from the crops grown in home gardens on house and property destruction. More than 80%

of the farmers have grown bananas and coconuts in their home gardens. When the people try to chase away elephants from their gardens houses could also be damaged. Elephants have a special liking to bananas and coconuts. Food can be reached with less effort than in the jungle, food are raw and there is a scarcity of food in the jungle are some causes for the elephants to enter home gardens more. This is proven by the Box 4.5.

Box 4.5

It is not sure when elephants are coming these days; it could be day or night. We had planted more than 30 banana trees around our house. Last Wednesday we heard some peculiar noise. My husband has gone to the chena and only my daughter and I were at home. Around 4 elephants came near the house and destroyed the whole banana plantation. I was scared even to scream. So I made a fire inside the house. After seeing fire elephants went away after around 15 minutes. When elephants come we are scared to death. Elephants have destroyed the paddy too.

Source: Field Study 2011

Conclusion

During the field study many points were identified in relation to the disruption of the rural livelihood due to human -elephant conflict. It was seen that the main livelihood of the 90% of the people in area is agriculture and elephants cause severe damage to the agriculture. It was also possible to estimate the damage cause by the elephants to agricultural activities.

When the distance is more from the home to cultivation land then the damage is also high while the distance is less damage is also less. Damage done to the cultivation lands situated in less than 05. miles is between 30% - 50% and damage done to the cultivation lands situated in more than 0.5 miles away is 100%. Damages done to cultivation lands situated closer to elephant corridors is also high. Regardless how various methods are been used as preventive measures, it could be seen there was very less chance of minimizing the damage. In addition to the agricultural activities, it was clear elephants harm human lives and properties too. 08 human lives have been lost and 03 have been injured due to attacks by elephants. Poverty and indebtedness is high in the area due to crop and property damages by the elephants.

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