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Elephant deaths due to Human Elephant Conflict in and around Bandipur Natioanl Park, Karnataka, India

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Abstract

Survey has been conducted in the fringe villages near Bandipur National Park, Karnataka in the year 2012 to study elephant mortality. Available forest department records on elephant death from 2007-2012 were also incorporated during analysis. The present investigation revealed that 33 elephants were electrocuted; 5were shot dead by gun and 1 killed by road accident. Elephants were killed near farmlands by farmers in defense of their crops. Among dead elephants males were 35.89 % and females were 64.09 %, their age class ranges from 1 to 38 years. Adults (16-65 years) and sub adults (6-15 years) of males and females were killed very frequently. Incidents took place normally in rainy (50 %) and winter (42 %) seasons as crop maturity correlates those seasons. Crop maturity and elephant kill found to be positively correlated in the park. Incidents were not uniformly distributed in all wildlife divisions within the park, ten incidents were reported from Omkar range, which is followed by Gundre region with eight elephant deaths, due to loss of home ranges in the past for agricultural activities. Forest department has to initiate steps to avoid reoccurrence of such incidents in the future.

Keyword: National park, elephant kill, electrocution, farmers, and compensation.

Introduction

As per IUCN (2007), report the Asian elephant (*Elephas maximus*) is one of the endangered species mentioned in Appendix 1 in Convention on International trade in Endangered Species[1]. In India it is placed under Schedule 1 of The Wildlife (Protection) Act, 1972[2]. The relation between elephant and man in India is ancient; no other animal had such a close association with the people. It is so much a part of our culture, religion, mythology and politics. Ever increasing population in the recent past raised the demand for more land for developmental activities and agriculture. The fragmentation and loss of wildlife habitat, pushes wild animal especially elephant close to the human population thus increasing the human-elephant conflict[3]. Elephant-human conflicts is an important issue as per conservation of elephants is concerned. Elephant mortality is one form of conflict prevailing in places where farmer's tolerance levels towards crop raiding elephants were less. Crop damage, loss of property, human injury and death by elephant are also other forms of conflict.

Elephant deaths by electrocution or gunshots in order to prevent crop depredation have been increasing steadily in the recent past and also been reported from all elephant ranges. Electrocuting the elephants has been reported in Chittor district of Andhra Pradesh[4]. In Garo hills, Meghalaya about 28 elephants were killed between 1984 and 1995 out of which 32 % were killed through gunshots[5]. Three elephants were killed possibly through gun shots while taking crop protection measures in the year 1992 in North Bengal[6]. Accident with train or vehicles is also sometimes responsible for elephant deaths where transport network run through the protected areas. Sukumar[7] reported high increase of elephant deaths in the Kollegal / Nangangud forest divisions of Karnataka in the past decades marks this as an important threat to the survival of elephants in the jungle. Killing one out of fifteen per year may reduce their population in the wild[8] and also three percent loss of elephants per year definitely off set the positive growth rate of this mega herbivore[9]. Demographic modeling indicated that the present loss of elephant population was just sustainable and any small increase in mortality was likely to cause population declines[10]. In the present investigation attempts have been made to find out nature of death and common factors contributing elephant mortality by farmers.

Material and Methods

Study area: Bandipur National Park situated in Chamarajanagar district, Karnataka, India. The study area comes in between the latitudes 11° 35' 34'' N and 11° 57' 02'' N and the longitudes 75° 12' 17'' E to 76° 51' 32'' E (Fig.1). Covering an area of 868.63 sq km, it shares its boundaries with Nagarahole National Park (Karnataka) to its northwest, Mudumalai Wildlife Sanctuary (Tamil Nadu) to its south and Wynaad Wildlife Sanctuary (Kerala) to its southwest. All these reserved areas are part of the Niligiri Biosphere Reserve, which is the favourable ground for the Asian elephant. Two national highways connecting Mysore - Ooty and Mysore - Calicut passes through the park. Elevation ranges from 680 meters to 1455 meters (Himavad Gopalaswamy Hill) from the mean sea

level. The average annual rainfall is between 914 mm and 1270 mm. The Kabini dam marks the boundary between Bandipur Park and Nagarahole National Park; the Moyar River separates the park from Mudumalai Sanctuary. In the year 1973 this park was brought under Project tiger. Three main seasons observed in the area, Monsoon from June to mid October when most rainfall occurs. Winter season starts from November to February and summer season in between March and May. The park has been divided into 11 wildlife ranges (table-2). Approximately 200 human settlements lie near the Park boundary in the northern side.

Survey was conducted on elephant deaths in the year 2012 as a part of study on human elephant conflict in the park. Detailed study of postmortem reports of each elephant death occurred between 2007 -2012 was conducted, which is available in the forest department provided information such as time of incident, date of incident, age and sex of the elephant and nature of death. The site of each incident was visited once again to note exact GPS point. Interview was conducted with farmers and forest staff using Rapid Rural Appraisal (RRA) and Participatory Rural Appraisal (PRA) method[11]. The questionnaire sought information on: age of crop, type of crop which is protected by farmer's with electric fence, location of farmland, approximate distance of the farmland from the park boundary and nature of death. During analysis, due to the rare occurrences of elephant mortality during the survey period, previous such incidents from the year 2007 were also investigated to get a broader picture of conflict[12]. Spearman rank correlation[13] was used to check linear relationship between elephant kills and crop maturity.

Results and Discussion

Though elephant death incidents due to conflict have been reported from time to time in the fringe villages around Bandipur national park, the intensity of elephant death occurrence seems to be moderate in contrast to other areas of southern India. As a result of conflict between elephant and man, at an average rate of 6.5 deaths per year, thirty nine elephant's deaths have occurred in the park during 2007-2012. One was accidental death, five were due to gun shots and remaining (Thirty three) cases were from electrocution (figure-2). The cases of elephant deaths due to conflict were well authenticated for the better understanding of the status of Human-elephant conflict situation in the park.

Elephants were killed by various means near the farmlands when they came to raid crops. In Sri Lanka around 639 elephants were killed by villagers in between 1951 and 1969 in defense of crop[14]. The age classes of killed elephants between 2007 and 2012 were between 1 and 38 years. Fourteen males (35.89 %) and twenty six females (64.09 %) were died in the park (table-1). Data on elephant deaths due to conflict related cases shows more death of females and their age classes ranged from 2 to 30 years. Loss of adult and sub-adult females (24) compare to their counterpart (10) in a park may cause significant effect on sex ratio. Increased mortality of elephants especially females decreases their gene pool[7]. If it happens even in the future it is very difficult to maintain healthy sex rate in the park and female population will be more vulnerable to death. It may reduce the present sex ratio of male to female 1: 13.5 in the southern side and 1: 5.3 northern sides[15]. Ground survey revealed that there was no intention to kill only females. Sukumar and Gadgill[16] reports, sometimes chances of death during crop raiding are equal for both the sexes in southern India. In almost all elephant ranges male are prone and being killed more compared to females because of their "high risk – high gain" strategy[16. 17] . As per data we are not able to correlate "high risk – high gain" strategy of male elephant in the study area as proposed by above mentioned authors.

When an irrigated and sown crop reaches maturity, responsibility on farmers to defend their crops increases. Farmers may kill elephants by various means to protect their crops. Crop maturity and elephant kill in Bandipur national park were found to be positively correlated (Spearman rank correlation coefficient $R_S = 0.7882$, $n = 9$, $P<0.01$) (figure-3). Williams and Johnsingh[18] observed seasonality of elephant deaths correlating with the harvesting period because of their crop preferences and observed positive trend and also significant correlation between crop maturity and elephant kill in Garo hills.

Table 1
Age and sex class of dead elephants due to conflict in the study area during 2007-2012 (Total-39)

Age class	Electrocution		Gunshot		Road accident		Total
	Male	Female	Male	Female	Male	Female	
Calf (Age < 1y)	1	-	-	-	1	-	2
Juvenile (Age 1-5y)	1	1	1	-	-	-	3
Sub–adult (Age 6 -15y)	3	9	1	-	-	-	13
Adult (Age 16 - 65y)	5	14	1	1	-	-	21
Old (Age > 65y)	-	-	-	-	-	-	-
Total	10	24	3	1	1	-	39
%	25.64	61.53	7.69	2.56	2.56	-	100

Source for the classification of elephant age groups: ANCF – 2008, (No. = 39 Male = 35.89 % Female = 64.09 %)

The spatial distribution of elephant deaths from eleven forest ranges suggests that Omkar range consistently experienced more elephant death as compared to the other ranges. Gundre range is second most affected one. Hediyala and Moleyuru ranges show equal death rates. The other ranges in the park reported fewer conflicts (table-2). Three ranges such as Bandipur, Ainurmarigudi and Moolehole merged with Wayanad and Mudumalai Wildlife Sanctuaries in the southern side of the park, thus no casualties were reported (figure-1). The possible reasons for the higher frequency of conflict in the Omkar and Gundre ranges could be due to higher degradation of habitat coupled with locations of waterholes at the fringe areas. ANCF[15] also reported, loss of forest cover in Omkar, Hediyala and Moleyuru ranges (possibly under revenue department) to a considerable degree due to agriculture in the past and less tolerance level among farmers towards elephants were main reasons for more deaths. Not in all the months elephants were killed with equal frequencies. Only two seasons' reports maximum mortality, winter seasons (November-February) accounts 50 %, where as rainy season (June-October) reports 42 %, but peak in October and November months (table-2), because winter and rainy seasons correlates harvesting period of sown and irrigated crops respectively near park as per local knowledge. Crop raiding in winter and rainy seasons were observed in all most all elephant ranges in Africa[19]. Only 8 % reported in summer season (March-May). The main reason for less deaths in summer is due to less intense or no agricultural activity in farmlands near park boundary.

Killing of thirty eight elephants by gun shots and electrocution was closely associated with crop raiding. People who were found guilty (elephant killed by them) admitted more dissatisfaction with the forest department for not taking any measures to control crop damage. The current compensation policy has not achieved its aim of helping victims of crop loss, only a small fraction of loss is compensated, therefore it is not surprising that elephants are injured and sometimes killed by farmers. Janaki and Sukumar[20] also identified factors like tolerance level among farmers, compensation system and landholding size (farmers having large farmlands can tolerate with crop raiding incidents) of farmers plays an important role in elephant deaths due to conflict. Due to proximity of their farmlands to the park edge; their farms are likely to be visited regularly by elephants and damage to their crops by elephants have a significant impact on sole income of the family. In order to protect their crops from elephants, farmers run a strand of wire along the edge of their field and illegally at night electrifies from the mains (230 V) (the high tension wires are illegally tapped by villagers from the near by electric poles) and used to check the entry of elephants into the farmland. Whenever wild elephants stray out of the forest and come in contact of live wire (connected with the regular power supply source) they get electrocuted (usually suffer a fatal shock which ultimately leads to death). Electric fence is highly lethal to elephants and other wild animals[14]. This method was not used by farmers permanently but whenever threat from elephants was more, live wire fencing was made active. Postmortem reports of elephants, which died because of shock, revealed that sudden cardiac arrest was the main reason for the death due to high voltage of power. Amirtharaj et al.[21] also reported >65 % elephant death from high power electric fence placed around farm fields near Rajaji National Park.

Interview with farmers, who are being accused for gunshots, told that guns were mainly used to drive away elephant heard from their farmland. It is one of the methods which have been used in all elephant ranges in Karnataka to disperse elephant herd away from farmlands[7]. During their usage accidentally many bullets from guns hit the main organs like brain and heart of the elephant finally causing death. Some time killing was intentional, just to take revenge against forest staff as one accused told personally. Electrocution may be accidental but killing elephants with guns were always intentional[22]. One male calf died while crossing the road in the evening when it was hit by the truck which was on the way to Mysore from Calicut on the interstate highway which passes through the park. The present interstate highway in the park killed many number of endangered species due to high traffic intensity[15].

Table 2
Monthly frequency and range-wise distribution of elephant death by farmers in the study area during 2007-2012

Ranges	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Bandipur	-	-	-	-	-	-	-	-	-	-	-	-	-
Kundakere	-	-	-	-	-	-	-	1	-	-	1	1	3
Maddur	-	-	-	-	-	-	-	1	-	1	2	-	4
Moolehole	-	-	-	-	-	-	-	-	-	-	-	-	-
Omkar	1	1	1	-	-	-	-	1	-	4	1	1	10
Hediyala	1	-	1	-	-	-	-	1	-	1	1	-	5
Moliyuru	-	-	-	-	-	-	1	1	-	2	-	1	5
Ainurmarigudi	-	-	-	-	-	-	-	-	-	-	-	-	-
N. Begur	1	-	-	-	-	-	-	-	1	-	-	-	2
Gundre	-	3	-	-	1	-	-	1	-	-	1	2	8
Gopalaswamy Betta	-	-	-	-	-	-	-	-	-	-	1	-	1
Total	3	4	2	-	1	-	1	6	1	8	7	5	38
%	8	10	5	-	3	-	3	15	3	21	19	13	100

In Uttaranchal around 30 elephants have been killed because of transport (road and rail) network within the Rajaji National Park[23]. Many mammals are more prone to accidents while crossing the road, as they get blinded by the vehicles headlights. Ignorance and lack of knowledge among drivers about the importance of wildlife may potentially increase the vulnerability of wild animals including elephant in the future[24]. Generally when incidents of electrocution, gunshot etc., occur a complaint is lodged with the police as the offence is punishable under the provision of Electricity Act 2003, Wildlife (Protection) Act-1972, Indian Electricity Act, Indian Penal Code and Criminal Procedure Code. Many of the cases of unnatural deaths are still in the investigation stage and charge sheet against the accused are yet to be filed. Effective deterrence in the form of quick arrest/investigation and filing of charge sheet is necessary to prevent such offences.

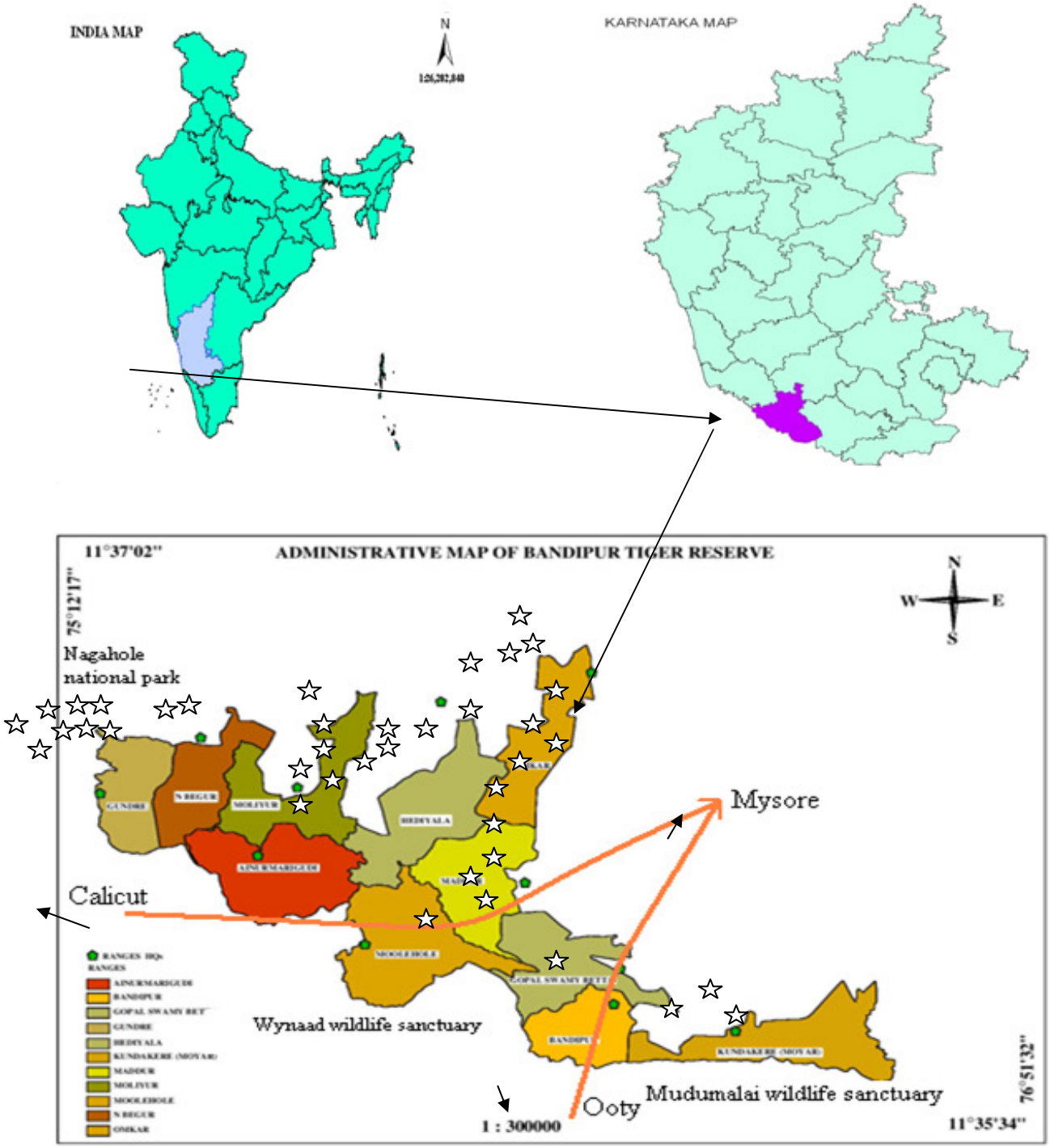

Figure 1
Map of the study area showing wildlife divisions, star marks represents the place of elephant death (No. 39)

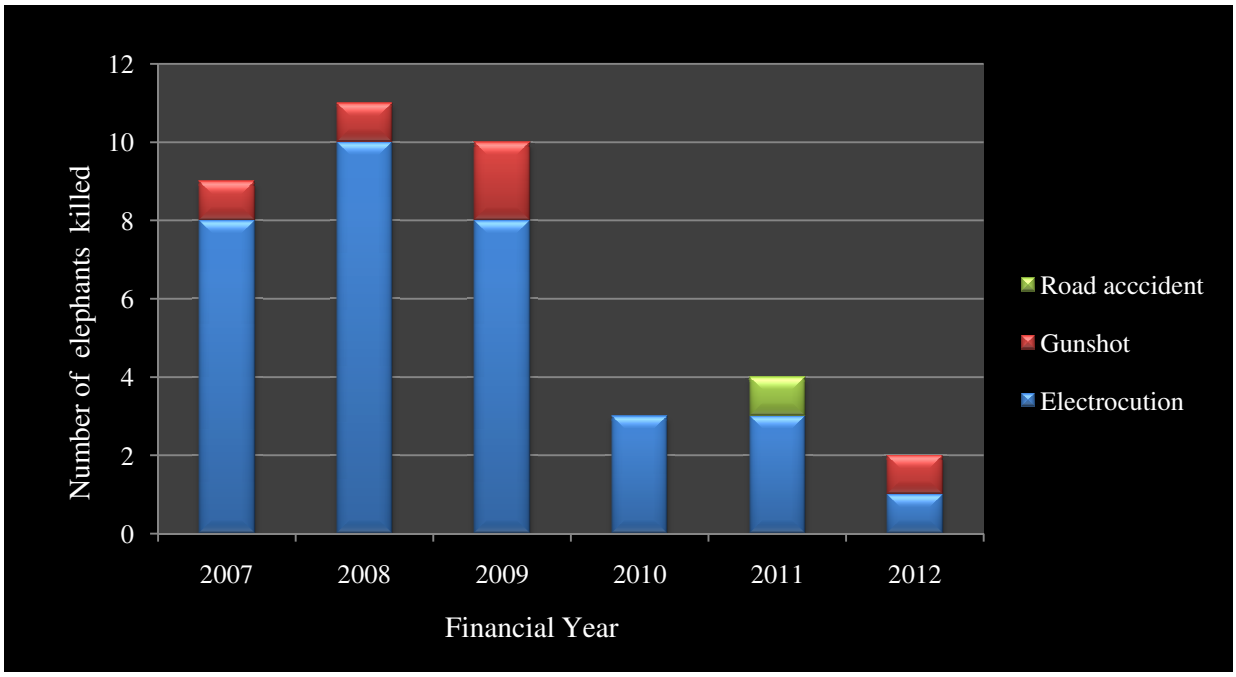

Figure 2
Number of elephants died due to conflict in the park from 2007 to 2012

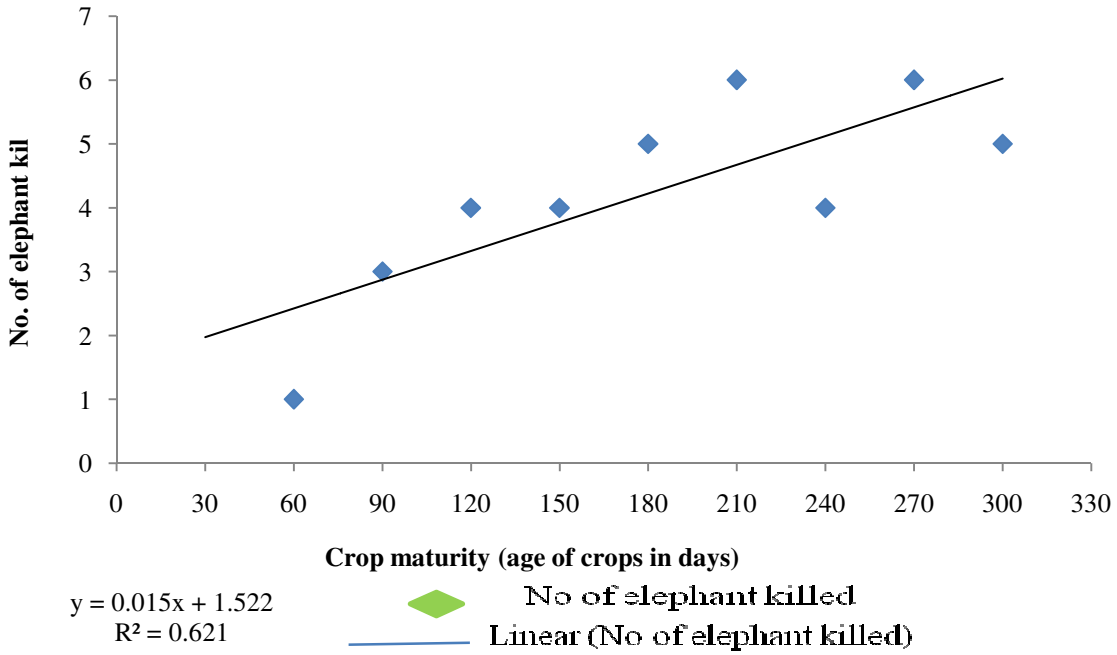

Figure 3
Showing increasing in elephant killing incidents with increase in crop maturity (38 cases)

Conclusion

In order to reduce elephant mortality, which is one of the serious matters related to elephant human conflict in the park many issues needs to be addressed. Paying proper compensation amount within time limits for effected farmers could increase the tolerance level towards elephants. Awareness programme should be given to farmers to increase their knowledge towards the potentiality of ecotourism of the park and conservation of wildlife. Well designed physical barriers should be put in place in vulnerable areas in consultation with local people. Part time squad containing local informants and forest watchers must be

established to monitor elephant movement along the northern side of the park boundary. Elephant deaths may be lesser in the recent past compare to previous years in the study area; it may rise again if we fail to implement some strong measures in favour of elephants in the future.

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