



JSS MAHAVIDYAPEETHA

JSS COLLEGE OF ARTS, COMMERCE & SCIENCE

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Re-accredited by NAAC with 'A' grade

Recognised by UGC as "College with Potential for Excellence"

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DECLARATION AND CERTIFICATE

I hereby declare and certify that, the Minor Research Project entitled "Man elephant conflict in Bandipur National Park, Karnataka, India" 1490-MRP/14-15/KAMY013/UGC-SWRO is a bonafide record of research work carried out by Mr. Lingaraju H G, Dept of Environmental Studies (UG) has been kept in the Library of the College and the executive summary of the studies has been posted on the website of the College.

Principal

**MAN ELEPHANT CONFLICT IN BANDIPUR NATIONAL PARK, KARNATAKA,
INDIA**

FINAL REPORT

1490-MRP/14-15/KAMY013/UGC-SWRO

Submitted to

The Joint Secretary and Head
South-Western Regional Office (SWRO)
University Grants Commission
P. K. Block Gandhinagar
Palace Road
BANGALORE – 560009

Submitted by

Lingaraju H G
Principal Investigator
Environmental Studies (UG)



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Annexure - III

UNIVERSITY GRANTS COMMISSION
BAHADUR SHAH ZAFAR MARG
NEW DELHI – 110 002

Final Report of the work done on the Minor Research Project

1	Project report No 1 st /2 nd /3 rd /Final	:	Final Report
2	UGC Reference No.	:	1490-MRP/14-15/KAMY013/UGC-SWRO
3	Period of report	:	From 04-Feb-2015 to 31-March-2017
4	Title of research project	:	Man elephant conflict in Bandipur National Park, Karnataka, India
5	(a) Name of the Principal Investigator	:	Lingaraju H G
	b) Dept and College where work has progressed	:	Environmental Studies (UG), JSS College of Arts, Commerce and Science, Ooty Road, Mysuru-25
6	Effective date of starting of the project	:	04-Feb-2015
7	Grant approved and expenditure incurred during the period of the report		
	(a) Total amount approved	:	Rs. 330000.00
	(b) Total expenditure	:	Rs. 278466.00
8	Report of the work done	:	Report Enclosed
	(i) Brief objective of the project		<ol style="list-style-type: none"> 1. Spatial and temporal analysis of human-elephant conflicts using GIS. 2. Study of villager's (farmers) perceptions and attitudes towards human-elephant conflicts. 3. To evaluate the effectiveness of various conflict control measures.

ii. Work done so far and results achieved and publications, if any, resulting from the work (Give details of the papers and names of the journals in which it has been published or accepted for publication)	: Enclosed as separate attachment (Work done) The results obtained from the research work has been published in <i>Indian Forester, 142 (10): 974-978, 2016 (Journal copy attached).</i>
iii. Has the progress been according to original plan of work and towards achieving the Objective, if not, state reasons	: The work has been carried out according to the original plan
iv. Please indicate the difficulties, if any, experienced in implementing the project.	: Nil
v If project has not been completed, please indicate the approximate time by which it is likely to be completed. A summary of the work done for the period (Annual basis) may please be sent to the commission on a separate sheet	: Completed
vi If the project has been completed, please enclose a summary of the findings of the study. Two bound copies of the final report of work done may also be sent to the commission.	Status of the project: Completed Copies of the final report of the work done has been enclosed Two bound copies of the final report of work done is enclosed
vii Any other information which would help in evaluation of work done on the project at the completion of the project the first report should indicate the output, such as (a) Man power trained (b) Ph. D awarded (c) Publication of results (d) other impact, if any	One paper is published

**SIGNATURE OF THE
PRINCIPAL INVESTIGATOR**

PRINCIPAL

Final Report of the work done on the Minor Research Project

1	Title of research project	:	Man elephant conflict in Bandipur National Park, Karnataka, India
2	(a) Name and address of the Principal Investigator	:	Lingaraju H G, Asst. Professor, Environmental Studies (UG), JSS College of Arts, Commerce and Science, Ooty Road, Mysuru-25
	b) Name and address of the institution	:	Environmental Studies (UG), JSS College of Arts, Commerce and Science, Ooty Road, Mysuru-25
3	UGC Reference No.	:	1490-MRP/14-15/KAMY013/UGC-SWRO
4	Date of implementation	:	04-Feb-2015
5	Tenure of the project	:	25 Months
6	Total grant allocated	:	330000.00
7	Total grant received	:	278325.00
8	Final expenditure	:	278466.00
9	Title of research project	:	Man elephant conflict in Bandipur National Park, Karnataka, India
10	Brief objective of the project	:	<ol style="list-style-type: none"> 1. Spatial and temporal analysis of human-elephant conflicts using GIS. 2. Study of villager's (farmers) perceptions and attitudes towards human-elephant conflicts. 3. To evaluate the effectiveness of various conflict control measures.

12	Whether objectives were achieved	:	The objectives of the study has been successfully completed
13	Achievements from the project	:	A paper has been published
14	Summary of the findings	:	A copy of findings is enclosed
15	Contribution to the society	:	The findings of the study provides status of human elephant conflict in the study region and also helps to take necessary measures from policy makers to mitigate conflict sustainably in the future
16	Whether any Ph.D enrolled/produced out of the project.	:	No

**SIGNATURE OF THE
PRINCIPAL INVESTIGATOR**

PRINCIPAL

CONTENTS

Page No.

Title page	
Annexure III	
Annexure VIII	
I Annual report	1
II Introduction	2
Objectives	
III Material and Methods	3 and 4
Study area	
Methods	
VI Results	5-13
Current status of Human Elephant Conflict	
Spatial and temporal patterns of human-elephant conflicts	
Study of villagers (farmers) perception and attitudes towards human-elephant conflicts	
Attitudes of local communities towards conservation of wild elephants	
Identification of conflict mitigation efforts of the forest department	

ANNUAL REPORT

An extensive literature was carried out on the present investigation from different institutions like Aranya bhavan (Mysore) and Forest department of Bandipur national park. Further, information was also collected from the journals and different websites through internet as full length research papers and research paper abstracts in the PDF.

Questionnaires are prepared to collect data on crop damage incidents, elephant kill, human injury and death to analyze the various factors related to each incident.

The topo sheets numbering 57 D/8, 57 D/12, 58 A/1, 58 A/5, 58 A/6, 58 A/9, 58 A/10 and 58A/14 of 1:50,000 scale related to the study area were collected from the Survey of India, Bangalore for geo-referencing. With the help of Arc-GIS (10.2 version) software different features were generated on map.

The records related to conflicts from 2007-08 to 2013-14 were obtained from the Deputy conservator of forests offices in Bandipur National Park.

Current status of HEC

All the analysis presented in this chapter is based on crop damage cases filed with the forest department by affected cultivators. The number of crop raiding incidents, the number of human death, injury and elephant mortality cases in the study area are a reliable indicator of intensity of conflict. Though conflict incidents have been reported from time to time in the fringe villages around BNP, the intensity of conflict occurrence seems to be severe in contrast to other areas of Karnataka. During our study (2007-08 to 2013-14) there were 24,328 crop raiding cases, 13 human death, 18 injury cases and 39 elephant deaths; however no human death and elephant mortality were recorded during 2013-14. The analysis of the data on number of farmers affected showed that crop damage by elephants, the incidences of human casualties by elephants, and elephant mortality by humans, did not show any trend.

I INTRODUCTION

The relation between wildlife and man, historically and prehistorically has often been antagonistic. Many wild animals are potential competitors to humans for food resources or threats to human life. Wild animals that directly compete with humans for resources such as food or water quickly become ‘problem animals’ are included in the “man-animal conflict” category. Elephants, the largest land mammals, also fall in the category of animals that are in conflict with humans. Elephants are found in two continents of the world today (Asia and Africa). In both the continents elephants invade crop lands and agricultural plantations. In India elephant distributed in different ranges of forest. From all its ranges the elephant -man conflict are known to figure prominently in man animal conflict cases. Human elephant conflict poses a major obstacle in elephant conservation efforts in the country.

Significant decline in the habitat and population of elephants has been observed in the Northeastern states. Even in the Southern states of Kerala, Karnataka and Tamilnadu, where elephants were poached for ivory has impaired the demographic structure of elephant populations. The proportion of mature bulls in these states has declined, considerably disturbing the sex ratio. In Bandipur Tiger Reserve (Karnataka) and Madumalai Sanctuary (Tamilnadu) the ratio of adult male to adult female has been reported to be between 1:12 to 1:15, whereas in Periyar Tiger Reserve (Kerala) this ratio has been stated to be around 1:100 (Menon *et al.*, 1997). Such abnormal sex ratios do not bode well for the future growth of these populations. Elephants are also moving to new regions on account of disturbances in their original home ranges. In fact, the elephants found in Andhra Pradesh have been migrants from Tamilnadu since 1984. However, major threats to the long-term conservation of the elephant include further fragmentation of habitat, continued poaching of bulls for ivory, and escalation in human-elephant conflicts resulting in public antagonism toward the species, hence the present project proposal proposed.

Objectives

- Spatial and temporal analysis of human-elephant conflicts using GIS.
- Study of villager’s (farmers) perceptions and attitudes towards human-elephant conflicts.
- To evaluate the effectiveness of various conflict control measures.

II MATERIALS AND METHODS

Study area

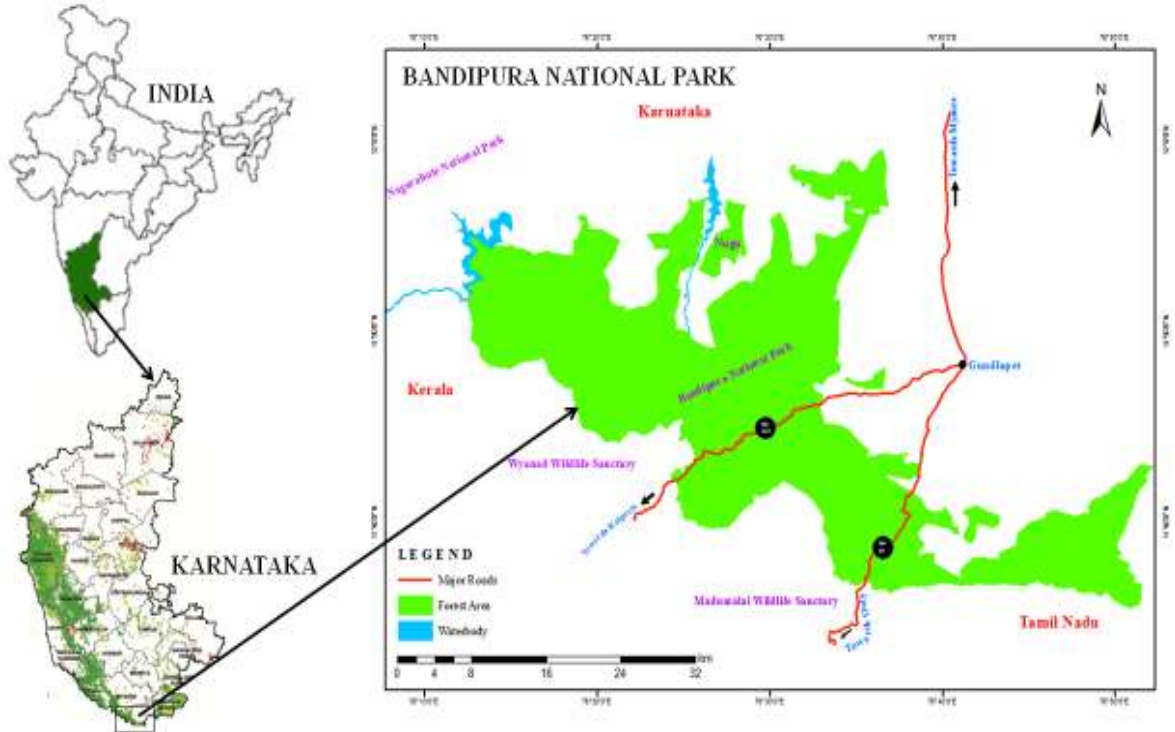


Fig. 1: The study area is located within Chamarajanagar district, Karnataka, India

Bandipur National Park located in Chamarajanagar district, Karnataka, India. The study area comes in between the latitudes $11^{\circ} 35' 34''$ N and $11^{\circ} 57' 02''$ N and the longitudes $75^{\circ} 12' 17''$ E to $76^{\circ} 51' 32''$ E. Covering an area of 868.63 km^2 , it shares its boundaries with Nagarhole National Park (Karnataka) to its northwest, Mudumalai Wildlife Sanctuary (Tamil Nadu) to its south and Waynad 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 (NH 67) and Mysore - Calicut (NH 212) passes through the park. Elevation ranges from 680 meters to 1455 from the mean sea level. The average annual rainfall is between 914 mm and 1270 mm. Approximately 200 human settlements lie near the Park boundary in the northern side (Fig. 1).

Methods

Objective 1: Spatial and temporal analysis of human-elephant conflicts using GIS.

Use of GIS in human–elephant conflict analysis enables us to identify key conflict zones at a glance, taking into account the influence of multiple geographical land cover and climatic features. In relation to HEC, researchers in Africa and Asia (Smith and Kasiki 2000, Sitati *et al.* 2003, Baskaran *et al.* 2007) have used GIS to identify and examine the relationship of HEC with determinants and its spatial pattern. In this study, the GIS is used to illustrate the human–elephant conflict in relation variables such as fragmentation level, extent of settlements/cultivation, perimeter of forest with settlement/cultivation and vegetation type.

Objective 2: Study of villager’s perceptions and attitudes towards human-elephant conflicts.

Understanding community knowledge or perceptions is possible only through a sustained empathetic investigation. Villages per range are randomly selected; families from each of these villages belonging to different economic classes are selected. The type of data collected included crops grown, amount spent on cultivation, average loss of crops and economic loss caused to them by elephants every year and alternative income sources if crops were damaged. Views of the villagers on responses of forest department in terms of mitigation measures, and their opinion about forest conservation and elephants are also noted.

Objective 3: To evaluate the effectiveness of various conflict control measures.

This study included a survey of the status of existing measures and their functional efficiency and quality of maintenance.

A. Survey of barriers: A survey is done to assess the status of existing elephant proof barriers .The survey attempted to investigate the current status and efficacy of the Elephant Proof Trench (EPT), electric fence and other barriers such as stone wall. The other measurements as part of the barrier survey included identification of the location of barriers, their distances from the village, and distances from crop land, total length of barrier and breakage points. The different barriers were surveyed on foot and mapped with the help of GPS. The foot survey assessed information on type of damage, cause of damage, status of damage, year of establishment of the barrier, status of nearest forest cover, the distance to nearest cultivation, type of cultivation and distance to nearest village.

B. Scaring of elephants: Interviews were conducted with forest staff involved in the elephant scaring operations to assess the efficacy of the methods followed in the division. In addition to this, farmers, or laborers, who engaged in elephant scaring operations, were also interviewed.

III RESULTS

Current status of Human Elephant Conflict

All the analysis presented here is based on crop damage cases filed with the forest department by affected cultivators. The number of crop raiding incidents, the number of human death, injury and elephant mortality cases in the study area are a reliable indicator of intensity of conflict. During our study (2007-08 to 2013-14) there were 24,328 crop raiding cases, 13 human death, 18 injury cases and 39 elephant deaths; however no human death and elephant mortality were recorded during 2013-14 (Table 1).

Crop damage is one of the severe forms of human elephant conflict. According to data from the Deputy Conservator of Forest, BNP; total crop damages cases for three years (April 2011 to March 2014) were 2,099 incidents. The frequency of crop damage was maximum ($n = 823$) during the year 2012-13, followed by the year 2011-12 ($n = 679$) and was minimum ($n = 597$) for the year 2013-14.

The study on the economic loss due to crop depredation reveals that the farmers had lost an overall sum of INR 58,50,705/- during the study period. Net economic loss for both seasonal and annual crops damage was estimated high for the year 2012-13 (27, 08,717) followed by 2011-12 (16, 30,012) and 2013-14 (15, 36,023).

As a result of conflict between man and elephant, thirty nine elephant's deaths have occurred in the study area during 2007-2013. Elephants were killed by various means near the farmlands when they came to raid crops. The age classes of killed elephants were between 1 and 38 years, which includes fourteen males (35.89 %) and twenty six females (64.09 %). Of 39 records which estimates age of dead elephants; 21 adults, 5 were calves and juveniles and rest were sub adults (Table. 2).

During 2011-12 to 2013-14 a total of 13 (41%) people were killed, 18 (59%) were severely injured by elephants. Of the 31 victims, 22 were males and 9 were females. Male victims, were aged between 32-73 years, females were between 29 - 62 years old. In the present study casualties by elephants for men was higher than female. The accounts of the circumstances in which people have been killed or injured by elephants include farmers (50%), grazers (21%) and dwellers (13%). Labours accounts 14%, who work in the fields near forest.

Table 1: Records of human-elephant conflict in Bandipur National Park

Sl. No.	Year	Number of Crop raiding incidents	Number of human injuries	Number of human deaths	Number of elephant deaths
01	2007-08	4911	03	03	09
02	2008-09	8870	03	04	11
03	2009-10	6040	03	03	10
04	2010-11	2408	03	-	03
05	2011-12	679	04	01	04
06	2012-13	823	02	02	02
07	2013-14	597	-	-	-
Total		24328	18	13	39

Table 2: Age and sex class of dead elephants due to conflict in the study area during 2007-08 to 2013-14 (Total - 39).

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

Spatial and temporal patterns of human-elephant conflicts

Compensation records reveals that a total of 107 villages reported crop damage from 2011 to 2013, the village that suffered maximum crop raiding incidents was observed in Hanchipura (No - 130) which has found to be significantly higher, followed by Yelachetti (No - 98), Naganapura (No - 92), Kurubarahundi (No - 86) and Honakanapura (No - 79), which accounts for a total of 35% of total crop-raiding incidents recorded in these villages. The villages Alanahalli, Gaddehundi, Hosakote, Cheluvayanapura, Belachalavadi and Kalanahundi were least suffered. Out of 107 affected villages 66 spreading across the study region falls in category I (minimal), while category II (low) includes 26 villages followed by category III (medium) covers 7 villages. The number of villages coming under category IV (high) is less (06) and only one village is severely affected in the entire region so that it comes under category V (intense). The magnitude of crop damage incidents at each point is shown in Fig. 2.

The spatial distribution of all villages that observed crop damage incidents during study period are indicated in Fig. 3. Sixty five affected village's lies within the range of 0-1 km, followed by twenty five villages fall within the range of 1-2 km, while the territory of 2-3 km covers three villages. Between the range 3-4 km six villages are reported, three villages lies in the range of 4-5 km and number of affected villages falls in above seven km was only two. Eighty per cent of affected villages fall within 0 to 2 km of the forest boundary was observed.

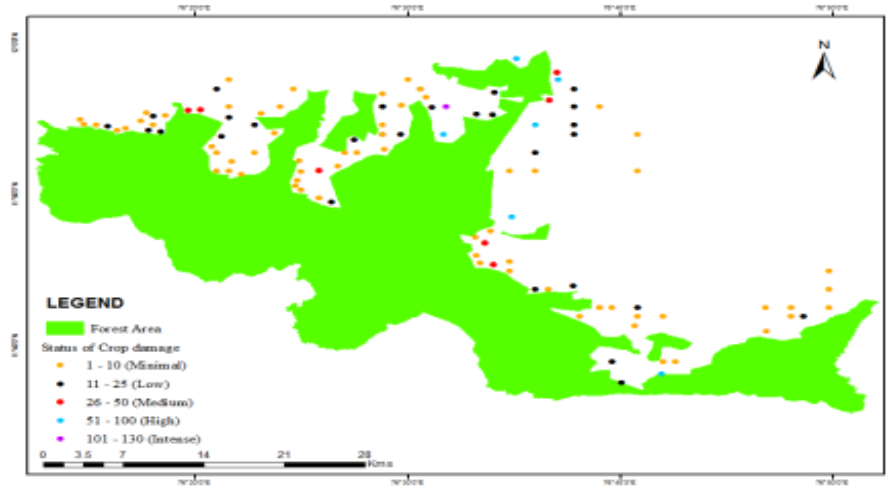


Fig. 2: Showing conflict villages that have been qualitatively assigned as "intense, high, medium, low and minimal" (No - 107).

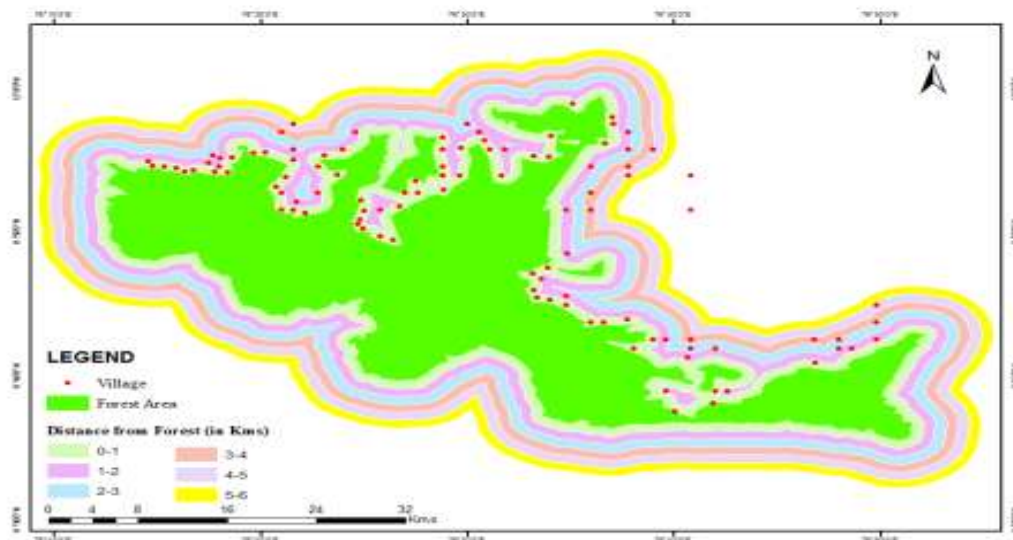


Fig. 3: Showing distances from forest to villages that report crop damage incidents in study area (No - 107).

The temporal distribution of crop raiding was not uniform in BNP, crop raiding in BNP was followed to have occurred throughout a year, higher in December lesser incidents during April and May. The highest peak between November and January can be explained by the factor that the harvesting season of certain crops falls in winter season (November and January). The present observation shows December to be the high conflict month for most of the crops except for cotton (whose peak conflict month is June) and jowar (highest in the month of July). January is the second peak conflict month for 4 crops and February, April, June and July are the peak months for one crop each.

The present study reveals that, maximum mortality of elephant occurred in winter season (November-February), which accounts 50 %, followed by rainy season (June-October) 42 %. Only 8 % reported in summer season (March-May).

Information on human kill and injury on various sites have been recorded for all incidents. This revealed that most of the human deaths had occurred in and around the farmlands (52%) while guarding crop. 15 % of incidents have recorded near road which was adjacent to the forest boundary, when victims were on the way to home or farmland or outside the village for some work or waiting at the roadside for a bus or walking from the bus stop to their house in the evening. 15% incidents were reported from reserved forests, when victims were collecting fuel wood or moving inside the forest area. In some (14%) cases, a water body was located close to the location of incident, the remainder reported from village (6%).

Study of villagers (farmers) perception and attitudes towards human-elephant conflicts

90 households were interviewed out of which 56 were male and 34 were female. The age of the respondents varied from 31 to 80, the average age of male was 57 years and the female was 49 years. Very few females were available to consult due to cultural reasons and they belonged to the age group of 36-54.

The land holding ranged from 0.5 to 21 acres, nearly fifty percent of the farmers' land ranges from 2.6 to 7 acre indicating the landscape dominance of marginal farmers. Small landholders are those having less than 2.5 acres, while large landholders were having more than seven acres. The land holding of each household was evident with 51% being rain fed dry land and 41% irrigated land. Similarly respondents from "small households" are from those in terms of the number of family members less than four, while "large households" includes the family members of more than seven.

The perceived reasons for the HEC; according to the villagers are mentioned in the Table 3, the reason for conflicts are a multi fold one with the loss of forest cover (24%), this

was followed by the preference of cultivated crops over forest vegetation (21%). Lack of water and food in forest in certain season were cited equally (13%) among respondents. Other root causes of HEC mentioned were increased elephant population in the park (11%), and lack of fear of humans (10%) and close proximity of the villages to the park (8%).

Table 3: People’s opinion on reasons for HEC

Sl. No.	Reasons for HEC	Respondents (in %)
1	Lack of water	13
2	Loss of forest cover	24
3	Increased elephant population	11
4	Loss of fear of humans	10
5	Proximity of the villages to the park	8
6	Lack of food in certain season	13
7	Preference of cultivated crops	21

When we interviewed people about any change in crop raiding over past 5 years, majority of the people (N=42) principally recorded that the problem of crop raiding was increased. There were only few (N=28) people reported that the problem was decreased, but some them (N=20) said it was constant during this survey. People were asked about differences in crop raiding by males and family groups. People said that the crop raids were mainly because of family groups (N= 55). Seventy one respondents have clearly pointed out that the elephants are known to cause damage more during the night time. Only few respondent (N=19) observed the incidents in the evenings and early mornings (Fig. 4). About 66 respondents witnessed elephant raids, only a few members (N=24) reported that the incidents occurred without their knowledge.

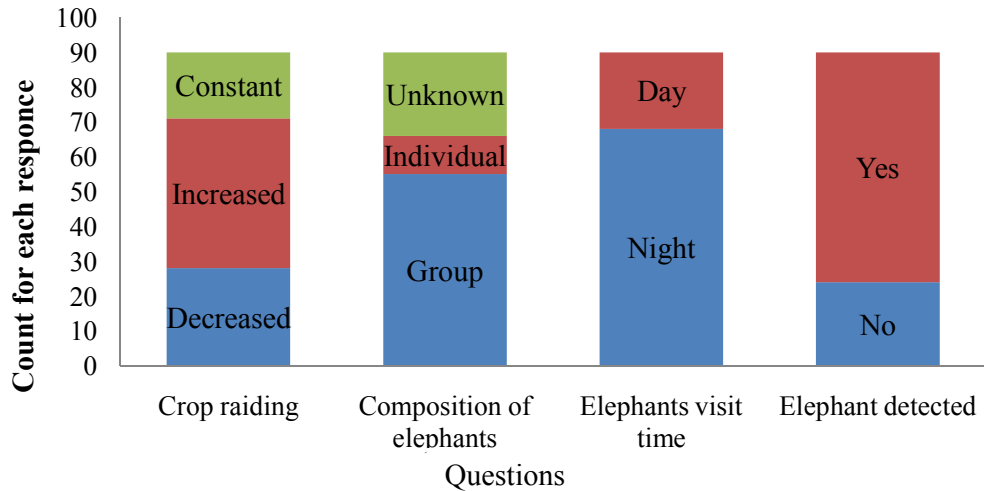


Fig. 4: Responses to questions regarding the crop raiding and behaviour of elephants. Each section of the colour represents different types of responses for each questions.

In addition to the prevention methods farmers are already employing, they had suggestions for measures that would help to reduce elephant pressure. Most of these proposals would involve outside assistance. Erecting an physical barriers like EPTs (21%) (Fig. 5) and also solar fencing around the perimeter of the entire cultivation area (17%) received top priority in people’s opinions. This was followed by fencing around the forest (11%), patrolling/warning (10%), concrete/rubble wall and bursting fire crackers quoted equally (9%), Assistance to chase elephants were suggested by few respondents (7%). However many farmers felt that regular meetings should be held to inform them of effectiveness options for mitigation. They felt that the best method of receiving information on elephants movements was through information sharing at local meetings, television and newspapers.

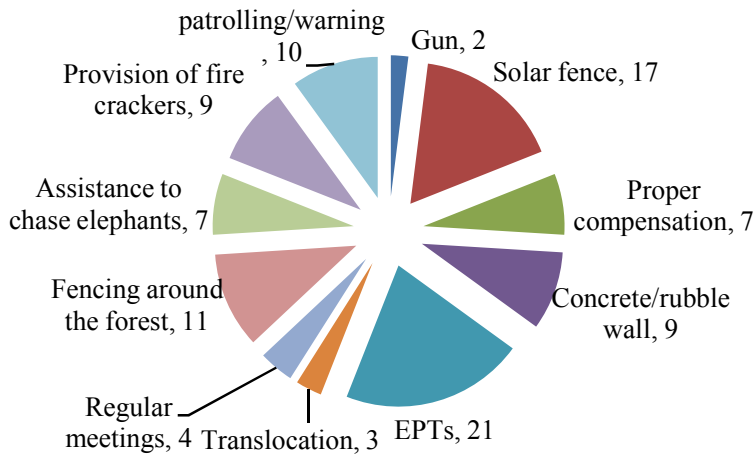


Fig. 5: Respondent suggestions for how HEC mitigation could be improved.

Attitudes of local communities towards conservation of wild elephants

Most respondents demonstrated positive thinking in elephant conservation, about fifty four percent (n=49) tolerated elephants, while 45% (n=41) wanted them eradicated. For the question “why they liked elephants”, respondents said they felt that elephant’s sightings bring revenue and jobs through ecotourism (25%, n=23), elephants have an ecological value, their presence indicates a healthy ecosystem (17%, n=15), they are endangered and their number decreasing (12%, n=11), for some respondents, elephants have a religious value in Hindu culture as a symbol of Lord Ganesha (28%, n=25) and some people quoted (18%, n=16), elephants provides beauty to the nature (Wildlife is appreciated not only for personal enjoyment, but also because it is the country’s wealth said by one respondent from Horeyala). Non-consumptive use values are by far the most important reasons given for the conservation of this species. The majority of them (61%) attributed this dislike to crop raids by elephants, 11% attributed it to property damage, and 18 % said because elephants attack humans they did not like them.

Identification of conflict mitigation efforts of the forest department

Human-elephant conflict problem is tackled by many mitigation measures, and the choice for mitigation of conflict between elephants and people have been recognized by many investigations. Multi-faceted approach, wherein farmers are compensated for their loss, attempts are made to repel the animals and the communities are educated on the values of conserving wild animals, is likely to be more effective. In addition to this forest department created EPTs and solar fences in vulnerable areas within the study area to reduce conflict.

Table 4 shows the details of EPTs in study area; there were 14 EPTs of different length all of which were evaluated. The present lot of EPTs has been erected in 13-year period starting from the year 1997-98 till 2010-11. Ten EPTs had solar fences running parallel to them, only six EPTs were stand-alone without solar fences. The EPTs used in the study area were constructed based on standard dimensions of the forest department which are of 3 m (top width) x 2 m (depth) x 1 m (bottom width). In almost all cases the top width and bottom width are equal to or greater than the standard dimensions. The depth is somewhat less than the prescribed 2 m in most cases. There were many crossing points in most EPTs. Of the EPTs sampled only two EPTs were recorded no crossing points.

Most of the crossing points showed signs of elephants crossing. A few of them showed signs of human and cattle movement. Overall, the assessment of damages by different causes for EPTs indicated that, manmade causes dominate the breakages (51%) followed by elephant

(23%) and natural regions 19% and unknown causes make up the rest 7%. The manmade causes were in the forms of path created by cattle, cattle path used by people for entering into forest to bring out forest products, excess rainwater flow into trench from the forest or agricultural land creating cattle path, and mud slides decreasing the depth of the trench and becoming a cattle path.

There were 23 solar units in the study area, the length of the fences ranged from 5 to 14 km and their total length was about 214 km. The solar fences have been installed from 2001 till the year of the study (2013). The solar sheds were constructed in between two 3 or 7 km to keep the energizer, battery and solar panels of two solar units. The wire used in these fences varies from 7-10 layers, three layers of wires viz. bottom, top and the third or fourth are connected to the power supply. The power supply in the bottom layer is intended to tackle the damage the elephants do with their legs, the top layer for dealing with the head of the elephant and the middle layer to deal with any part of the elephant body including the trunk.

Table 4: List of Elephant Proof Trenches in the study area

Sl. No.	Year Built	Length (km)	Remarks
1	1997	6	-
2	1998	13	Parallel to Solar fence
3	1999	8.5	Parallel to Solar fence
4	2000	9	-
5	2000	4	Parallel to Solar fence
6	2001	11	-
7	2002	6	Parallel to Solar fence
8	2004	7	Parallel to Solar fence
9	2005	9.5	Parallel to Solar fence
10	2005	2	-
11	2006	10	Parallel to Solar fence
12	2007	7	-
13	2007	13	Parallel to Solar fence
14	2009	4	Parallel to Solar fence
15	2010	12.5	Parallel to Solar fence
16	2011	9	-
	Total	131.5	

Table 5 shows the detailed evaluation of the solar fences. They contain status of the fence, faults in the fence and reasons for the same. Of the 23 solar fences, 17 were operational 2 were intermittently operational and 4 were non-operational. The non-operational fences had been in this condition from 3 months to 1.5 years. Problem with the battery was the most common problem and main reason for failure in operation. In remaining cases damage to the fencing was noticed. Lack of funds was cited as the main reason for poor operation of solar fencing.

Table 5: Status of solar fence in the study area

Sl. No.	Year built	Length (in kms)	Fencing as whole			
			Status	Duration of non- operation	Causes of non-operation	Reason for problem
01	2001	09	Operational			
02	2001	12	Operational			
03	2008	08	Operational			
04	2000	11	Un operational	1-1/2 year	Battery, fencing and solar panel	End of contractor term
05	2009	9.5	Operational			
06	2006	09	Operational			
07	2006	10	Intermittent	3 months	Battery	Lack of funds
08	2008	05	Operational			
09	2011	10	Operational			
10	2012	09	Operational			
11	2013	13	Operational			
12	2004	7.5	Un operational	1 year	Battery and solar panel	End of contractor term
13	2006	07	Operational			
14	2003	14	Operational			
15	2009	12	Un operational	9 months	Battery and fencing	Lack of funds
16	2011	07	Operational			
17	2011	09	Operational			
18	2010	10.5	Operational			
19	2010	9.5	Operational			
20	2008	8	Operational			
21	2000	9	Un operational	7 months	Battery, fencing and solar panel	Lack of funds
22	2007	10	Operational			
23	2002	5	Intermittent	5 months	Battery and solar panel	Lack of funds

Conclusion

Blockage of elephant migratory routes due to various anthropogenic activities coupled with cultivation of elephant preferred crops such as finger millet, coconut, banana, red gram and sugarcane in large extent along the all forest ranges and lack of food in the forest in some season inevitably attracts more human-elephant conflicts in the in the region. All preventive methods used by villagers and forest department provided only short term relief. As long term measure, intensive management of elephant migratory routes will be needed. Also management strategies in this division should be aimed at regulating land use changes at least 2 km from forest boundary and exhaustive research on resolving human – elephant conflict. Crop insurance schemes also should be practiced extensively. A comprehensive strategy including short term and long term measures are needed to bring down the Human-Elephant conflict to an acceptable limit.

**SIGNATURE OF THE
PRINCIPAL INVESTIGATOR**

PRINCIPAL