

Vol 5 Issue 4 Jan 2016

ISSN No : 2249-894X

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*Monthly Multidisciplinary  
Research Journal*

*Review Of  
Research Journal*

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**RNI MAHMUL/2011/38595**

**ISSN No.2249-894X**

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ISSN: 2249-894X

Impact Factor : 3.1402(UIF)

Volume - 5 | Issue - 4 | Jan - 2016



## PREVENTIVE METHODS FOR HUMAN ELEPHANT CONFLICT AT THE FRINGE VILLAGES OF NAGARAHOLE FOREST- A STORY OF SUCCESS AND FAILURE



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### ABSTRACT

Human Animal conflict has attained global attention due to the casualties, deaths and damage costs for animals, human and properties.

Nagarahole reserve forest is own such serious human animal conflict region in particularly it is much more serious related to human elephant conflict. According to the GPS track points to trace the elephant entry points, it was digitized numbering 518 entry points to stretch of 450 km between Cauvery to Kabini Rivers. The many villages which are situated a amidst of forest, clearing the forest inside, few villages immediately adjacent to the forest boundary in quadrangle type of a forest boundary and certain villages situated away from distance of 5km. The non-availability of food and water and surplus food at a farm land is main attraction of elephant entry in to villages. Elephants are most intelligent animal and try to enter the farm land despite the different preventive measures that has been adapted by the forest department, villages and individuals.

From this study the various methods that has been adapted in order to prevent elephants entry into farm land from the forest is discussed in detail, taking some of sample village and detailed preventive measures both successful and failure methods

**KEYWORDS** :human elephant conflict ,success and failure,sample village ,HEC.

### 1 INTRODUCTION

Only few animals snatching much attention and emotion in the world regarding human animal

conflict but elephants getting much more kindness and sentiment through its imposing size, great level of cleverness, aggressive and complex social behavior.

The elephant is a symbol of arrogance, prestige, cultural legacy and elephant has been (Prithviraj Fernando et al,2008)respected and worshiped as a god, used as fighter, representative, animal of weight and has a central place in Indian civilization.

Today elephant is one of the most important animal for protection in India however the quarrel between humans and elephants is called HEC(Prithviraj Fernando et al,2008), occurring mainly in the buffer zones of the forest boundaries because crop raiding by elephants and human interference in the forest.

The worry of human elephant conflict is not simply crucial safeguard concern, then also prime government and socio-economic disputes. Hence purpose of human elephant conflict is a main nervousness and great importance for protection of elephants in countries like India and changing the natural habitat to human organized land use by human causes loss of elephant habitat, and advanced crop raid by elephant have chance to meet human and elephant as well as guarding the crop at the field effects injury and death of humans and elephants, engaging in the mitigation methods by people mounting human elephant conflicts.

Agriculture in region with elephants has been the average in many parts of India for hundreds of years, to increase nutritious value, elephants are selected cultivated crops than varieties of wild plants, (Prithviraj Fernando et al,2008) and crops are much more attractive to herbivores than the wild fodder. Crop raiding is an overriding factor where crops are cultivated in region with elephants and guarding the crops from raiders is invented way by farmers.

To prevent and reduce crop raiding by elephant in elephant prone region farmers have been use different and traditional methods but in the past few decades' human elephant conflict is mounting, so technological advances have use in additional methods but traditional methods are easy to use, have low costs and effective at individual level. (Janaki lenin and Sukumar R (2011)) However human elephant conflict is increasing in rapid, so more technical and sophisticated methods need to be used to control the conflict.

And we find different and traditional mitigation methods are used in the different levels and employed in human elephant conflict mitigation, firstly Tree top huts, Chasing away, Shouting, Drumming, Fire, Crackers, Torch light, Gun, Alarm, Kerosene dip throwable cloth fire ball at the individual level(Prithviraj Fernando et al,2008), secondly Mono cropping, Patrolling, Chasing away at the village level, finally Trenches, Solar fencing, Elephant proof wall, Patrolling, Translocation, Lighting at the park at the government level.

## 2 STUDY AREA

The Nagarahole national park has located in between 1205' -1208' north latitudes and 7605'-76015' east longitudes, and cover 1250sq km, and park is situated 94 km from Mysore city in the western direction. The park stretches north to south in Kerala as Waynad forest, west to east as Bandipura and the adjoining forest in Tamil nadu is called as Madumalai reserve forest.

The peripheral villagers living along the buffer zone of 5 km from the forest boundary make their livelihood with the help of irrigation facilities practicing wet crops like sugarcane, banana, ginger, turmeric, tobacco, paddy etc. During the summer days the animals especially elephants come out of forest boundary, 5kms peripheral zone either damage crop or kill man as well as damage.

FIGURE NO 1



### 3 MITIGATION METHODS

Elephants are more sensitive and intelligent animal, and they always try to enter in to the agricultural land and villages in search of food and water, the mitigation of elephant entry in to the farm land is the difficult task for forest department, fringe villagers and individual. And they use alternate preventive methods to avoid elephant entry in to the farm land.

We have walked 450 kms by foot along the forest boundary with G P S survey to collect exact elephant entry points and what are the techniques are used to mitigate elephant entry from the river Cauvery to kabini of Nagarahole national park by forest department, villagers and individuals.

According to all respondents the preventive methods that they used to scare elephants, with torchlight, shouting, crackers (explosives) drumming and oil lamp. Additionally most of the defendants mentioned that they constructed tree top watching tower, from which they guarded their fields at night.

This is always carried out in groups, tree top huts, torchlight, shouting and crackers, drumming are widely used throughout my study area, and oil lamps are used the least perhaps because the more popular techniques are usually employed first. Specifically tree top huts and torchlight are used first above all other practices followed by shouting and then crackers, shouting and drumming are an important practice that 6 to 7 respondents even said they shout continuously throughout their efforts to deter to raiding elephants at the same time drumming and crackers are also use to deter raiding elephants gun is used last resort perhaps because that is more expensive than other deterrence method.

Although torchlight's are mainly used first in driving the elephants away (Talukdar et al. 2006, 2007).I found that there was no reduction in crop loss or house damage if they were instead used later on, whether or not villagers constructed tree top huts to aid in guarding their fields that is also did not affect Human-Elephant-Conflict level. And we find different techniques are used in different level are



### 3.1 PREVENTIVE MEASURES BY FOREST DEPARTMENT LEVEL

#### • ELEPHANT PROOF TRENCHES

Forest department (Lahkar et al.2007) of Karnataka or Government of Karnataka has invested 37.661 lakhs of rupees, to dig and maintain, the elephant proof trenches in Karnataka and around Nagarhole National park is one of the mitigation methods to prevent elephants entry in to the agricultural land and still digging the trench around the Nagarhole National park and need to be completed, but improper management and digging of trenches by forest department and Government is leads to the elephants entry in to the agricultural land, according to respondents while field survey they said, improper method of trench is not prevent elephants entry and elephants are very clever, and they know how to cross the trench, and enter into the agricultural land, but for some extent it is one of the better preventing method (Martina M. I. Di Fonzo, 30 August 2007) , and semi-permanent, but maintenance and digging cost is very expensive, and suitable only for flat and dry terrain.

FIGURES NO 2





Improper trench at Bullenoor and Metikuppe forest range  
Photos:vishwanatha HR



Loose soils sliding into trench at Kademanuganahalli village forest boundary Hunsur Kaluk.  
Photos:vishwanatha HR



Metal trench damaged by elephants at Tibet camp near Gurupura



New trenches digging at Metikuppe forest range  
Photos:vishwanatha HR



Elephants are helping each other to Escape from Trench. Source: KETFR 2014

### 3.1.2 SOLAR FENCING:

Government of Karnataka or (Kathleen G. Mennell and Robert J. Scholes 2007) Department of Forest of Karnataka is taking care of about the installation of solar fencing in Karnataka and around Nagarhole National park and investing 34.298 Lakhs of Rupees in the year 2013-14, for installation and maintain, but improper maintain of solar fencing around the National park is leading to the entries by elephants to the agricultural land. And our observation during the field survey and local people said, elephants are cleverly disconnecting the solar fence to enter the agricultural fields (Janaki Lenin Raman Sukumar 2011), and forest department has installed the solar fence in un-trenched areas of Metikuppe forest range, trench is supporting to the solar fence, without trench the installation of solar fence will not be prevent the elephant entries in to agricultural land, (Prithviraj Fernando et al, (2008) and this method of prevention of elephants is semi-permanent and adaptable, but maintenance and installation of solar fence is very costly.



TABLE NO 1

Solar fence and Trench at the Nagarahole Forest Boundary		
1	Solar fence without Trench	96 km
2	Solar fence with Trench	336 km
3	No solar fence and Trench	18 km
4	Total	450 km

•ELEPHANT PROOF WALL

Where exactly elephants are entering into the agricultural land from the forest, their forest department constructed elephant proof walls (Prithiviraj Fernando et al, (2008), and spending lot of money for its construction, it is expensive, but semi -permanent, high maintenance and suitable for flat and dry terrain.

The quality construction of elephant proof wall must be good (SimonHedges and DonnyGunaryadi, 2009), and then only prevent the elephants entry into agricultural and, low quality of construction will not be prevent the elephants (Janaki Lenin Raman Sukumar 2011).



FIGURES NO 5



•PATROLLING BY FOREST GUARDS:

Forest department guards and watchers are (Sunjay Gubbi,2012) beating around forest boundary by jeep or two wheelers or by walk throughout night to prevent elephant entry in to agricultural land and to help farmers, who are guarding the crops. And forest department spending 51.867 Lakhs Rupees for patrolling in the nagarahole national park, and this method is cheap, inexpensive, immediate effect, but temporary effect and dangerous(Prithviraj Fernando et al,2008).

FIGURE NO 6





Forest guards are watching around Neralakuppe village of Hunsur Taluk.  
Photos: vishwanatha H R



Shivajinoo patrolling with forest guard at Kogilwadi village, photo: vishwanatha H R



Prof. Arundas, patrolling with forest guards at D B Kuppe photo: vishwanatha H R



Prof. Arundas, patrolling with forest guards at D B Kuppe Photo: vishwanatha H R

#### .1.5 LIGHTING AT THE FOREST BOUNDARY

Forest department of Karnataka or (Prithiviraj Fernando et al, (2008), Government of Karnataka installing the lights at the edge of the Nagarahole national park, where exactly elephants frequently entering into agricultural land, to prevent the elephant's entry into agricultural land, and spending money to installing the light and to manage the system, it is expensive, temporary effect and dangerous. Some time it extends up to elephant death.

FIGURE NO 7



Lighting at the Budanoor village forest boundary of H D Kote Taluk

Photos: vishwanatha H R



Lighting at the Hunsur upper village forest boundary of H D Kote Taluk

Photos: vishwanatha H R

•RAILING AND CONCRETE BARRIERS

Forest department of Karnataka take initiative steps to make some required preventive methods to control elephant entry, such as Trenches(Prithviraj Fernando et al,2008), Solar fencing, now recently making railing barriers with 212 crore Rupees around nagarahole forest and installing the barriers at veeranahosalli forest range, but this method of prevention is not ultimate method because the elephants already destroyed the railing barriers and entering into the agricultural land, however this method is also preventing elephant entry for some extent.

FIGURE NO 8



•TRANSLOCATION

Some man slater or tusker, Makhana elephant are having attacking nature and not afraid to any gun, fire, trench, solar fence, of prevention methods, they just destroyed and entering into the agricultural land and raid, eat the crops, if we disturb when they eating crops they will attack the farmers, such elephants are very dangerous and find out by forest department officials and guards, farmers, and trans locate in to dense forest and for away from the farm land. This method is also preventing the some targeted elephants entry.

Respondents said that Makhana (adult lone male, without tusks) elephants are too dangerous



then tusker (adult with tusks, usually part of herd). We can escape by tusker or herd of elephants, but we can't escape by makhana elephant, and generally dangerous and always man slater in the forest fringe villages (Prithviraj Fernando et al, 2008).

• PREVENTIVE MEASURES BY VILLAGE LEVEL

• FIRING AT THE ELEPHANT ENTRY POINT

All animals are always afraid to the sound (Prithviraj Fernando et al, 2008) and fire therefore farmers and guards of the forest department firing at the exact elephant entry point, where frequently entering in to agricultural land. In such points farmers and guards make fire to avoid the elephants entry, correspondents said that is very risky because some elephants noiselessly and soundlessly come and attack, and many times attacked human that resulted into the death, in spite of that farmers are make a fire at the entry points that will give signal or presence of humans to the elephants that will reduce the entry.

FIGURE NO 9



Firing at the entry points at veeranahosalli village. Photo: vishwanatha HR



Firing point at the forest boundary near the Udupepur village of Hunsur taluk. Photo: vishwanatha HR

3.2.2 PATROLLING BY VILLAGE PEOPLE

Some villages which are situated in the forest fringe are make a groups of people to beat around forest boundary with well-equipped to prevent elephant entry into the agricultural land for alternative days (Prithviraj Fernando et al, 2008), when elephant enter into the farm land these group of people come and help to the farmers or who are guarding the crops. According to the field source, out of 176 villages only 9 villages have patrolling group of people in the nagarahole forest fringe villages.

FIGURE NO 10



Patrolling the Elephants by villagers at Koluige village, Hunsur taluk. Photo: vishwanatha HR

•CHASE AWAY

Chase away the elephant by farmer from farm land is most difficult and dangerous preventive method but farmers chase the elephants with cost of their life, generally elephants are aggressive towards human and that leads to the death but farmers needs to guard the crops from elephants to their livelihood, this preventive method common in the forest fringe village(Prithiviraj Fernando et al,2008), and respondents said chase away gives immediate result and which decrease the crop raid by elephants.

•MONO CROPPING:

Elephants are entering the farm land because of food(R Sukumar,at,el,1992), when we gone for tiger censuses in the year 2013,and we found up growing trees and full of lantana weeds in around D B Kuppe region of nagarahole forest, by up grown trees elephants cannot get food because of height, trunk of elephant will not reach for that height, and weeds can't eat by elephant.283 respondents said out of 327, elephants are entering into the farm land because lac of food in the forest, but in the farm land plenty of crops available and they can eat varieties of food in single(Fernando et al. 2005, Boominathan et al. 2008) strike, but in the forest situation elephant should beat at least 10 to 12 km to get minimum food, therefore elephants are always try to enter into farm land, and elephants like only few crops such as sugarcane, maize, ragi, paddy, cotton, pulses, vegetables, crops like chilly, (Siman Hedges and Danny Gunaryadi,(2009)) tobacco, ginger, turmeric and floriculture won't like by elephant, therefore we can control the elephant entry by mono dislikeable cropping pattern.

Mono cropping is suggested preventive method in the co-existing area of human and elephant but we found only few people growing single dislikeable crops along the forest boundary, and forest officials also saying to farmers to grow dis likeable by elephants at the boundary.

FIGURE NO 11



Marigold flower at forest boundary near Hamsakrupa village. Photo: Vishwanath H

3.3 PREVENTIVE MEASURES BY INDIVIDUAL LEVEL

•TREE TOP HUTS

Execution of protecting the crops by farmers in different stages and different groups, in different places, (Prithiviraj Fernando et al,(2008)) some farmer guarding the crop field individually and protect the edges of neighboring crop field(Cheryl D Nath & R sukumar,1998), or helping to the other farmers. Farmers dare depends on elephants fear, elephants particularly herds of female farmers easily drive them, young and tuskers or makhana elephants are difficult to chase, but the simple presence of people in tree top huts in the fields may bring down elephants from raiding crops, tree top hut or



elevating huts on trees offer a vantage from which to monitor the fields and also put forward of safety. The one place presences of farmers also allow them to react without delay to raiding elephants, which minimize crop damage. And 99.69% of the farmers are having tree top huts around forest fringe villages of Nagarahole

FIGURE NO 12



### 3.3.2 TORCH LIGHTS

Using of torch light is common phenomena in the prevention of elephants in the forest fringe villages when elephants entering in to the agricultural field, farmers are use the torch light to scare and away the elephants from farm field (Sukumar 1989).

Correspondents said while field survey 99.69% of the farmers are use the torch light and elephants are so afraid and sometimes aggressive to the torch light because farmers who are guarding the crops from the tree top huts they often project the torch light towards crops to see the elephants are come or not, if elephants eating the crops while farmers concentrate more torch light on the eyes of the elephant, that light will hard to elephants, and they start to move from the crops field, but sometimes when farmers project weak or dim torch light on the elephant eye while crop raiding, they will get angry and aggressive towards farmers, in spite this farmers are using the torch light as a preventive method.

FIGURE NO 13



•DRUMMING

Farmers are practicing their own methods to control elephant entry and drive the elephant from the agricultural land, among all the methods drumming is one of the most important method(Prithiviraj Fernando et al,2008), people who are taking care the crops from the elephants they hang a metal tin to the branch of a tree or keep with them, when elephants entering into the farm land they start to beat the tin box and that produce intolerable sound, for that sound elephant get afraid and start to go back. Respondents said every farmer is using the drumming to prevent elephants, because this is a cheapest method than other methods. And 98.77% of the farmers are using drumming as a mitigation method around nagarahole forest fringe villages.

FIGURE NO 14



3.3.4 FIRE:

Lighting fires have been a worldwide method of crop protecting against elephants from very old times(Prithiviraj Fernando et al,2008). Occurrence of humans fires are keep elephants away from crop fields, or adjoining area by presenting signals that is clearly connected with humans, such behavior inclined to lose their success in protecting crops as elephants become familiar with increased disclosure to them, and the alertness that such methods are not backed by any real physical threat or harm, males appear too familiar to traditional methods of crops protection than females. And 73.7% of farmers are using the fire as a mitigation method in fringe villages of Nagarahole forest.

FIGURE NO 15



#### •INDIVIDUAL ELECTRIC FENCING

Farmers install solar electric fencing for their own crop field to control elephant entry (Prithiviraj Fernando et al, 2008), because government or forest department is not managing properly the solar electric fence along the forest boundary of Nagarahole national park. According to the respondents 90% of the farmers are having own solar electric fencing. Because improper management and poor electric fencing by forest department and not completely installed, still needs to be installed, so elephants are easily entering in to agricultural land from uninstalled solar fencing area, but farmers need to guard the crops for their livelihood so they installed their own electric fencing for individual land parcel, to prevent the elephants entry and guard the crops, government is providing subsidy for farmers to install the solar fencing.

TABLE NO 2

No of House Holds having Individual Solar fencing at Nagarahole Forest Boundary			
SL NO	Villages	No, of House Holds	Individual light at crop field
1	Utthenahalli	6	6
2	Muddanahalli	5	4
3	Alalur	6	5
4	Abbalathi	5	5
5	Kogilavaadi	6	6
6	Habatoor	5	4
7	Malangi	4	2
8	Muttur	6	4
9	Lingapura	6	5
10	Kurubarahosalli	6	6
11	Veeranahosalli	6	4
12	Billenahosalli	7	5
13	Konanahosahalli	7	5
14	Neralakuppe	8	6
15	Uduvepura	9	6
16	Bharathavaadi	6	5
17	G M Halli+Haadi	17	10
18	Siddapura+Kallahatty	19	12
19	Agasanahundi + Colony	21	16
20	Metikuppe + Haadi	37	19

CHART NO 1

FIGURE NO 16



•LOCAL ALARM

Different methods of alarms are locate on the edge of crop fields of forest boundary and by segregating, highlighting human areas and awaking formers, and then react for further action, to prevent raiding (Prithviraj Fernando et al,2008). Farmers can escape from serious threat or physical harm, and reduce the crop raid by using alarms at the edges of farm land, when alarm made sound while elephant entered into agricultural land.

At edges of crop fields of forest alarm systems permit farmers to relax from keeping regular and reducing physical stress and lack sleep in position where damages are in frequent. And 32.02% of farmers are using the alarms in the nagarahole forest buffer villages.

FIGURE NO 17



•SHOUTING

Farmers make a rise voice or shout in different sound for control elephant entry and push them from farm land, for such different sound or shouting elephant get afraid and hesitate to enter into the agricultural land (Prithviraj Fernando et al,2008). And 6 to 7 farmers continuously shout while drive the elephants from agricultural land. 100% of farmers are using shouting as a preventive method in the forest fringe villages of nagarahole forest.

•CRACKERS

Some elephants once enter into the farm land they won't go from crop field until fill their stomach(Prithviraj Fernando et al,2008), in that situation farmers need to push them out from the crop land.

Therefore Farmers bust the crackers, that produce huge sound, for that huge sound elephants move from the farm land, respondents said while field survey 99% of the farmers are using crackers as a preventive method and forest department itself providing crackers to the farmers, for who are guarding the crops in the forest fringe villages.

FIGURE NO 18



Crackers provided by forest department to villages of Nagarahole forest



Crackers provided by forest department to villages of Nagarahole forest

• INDIVIDUAL LIGHTING AT THE CROP FIELD

All the respondents said while field survey and our observation is that forest department is not maintaining properly the solar fence and lighting at the forest boundary(Prithviraj Fernando et al,2008), if they maintain properly no need to make a lighting at the farm land and forest boundary but they are not, therefore farmers only install the lighting system at the crop field to control elephant entry and protect the crops by other animals.

All the animals are not raid the crops during day time because of light and raid only at the night, so farmers install lighting,because all the animals include elephants afraid and hesitate to enter into farm land and reduce to the crop raid by animals.



Lighting at the crop field near Nagarahole forest, photo: mahaveera198



Lighting at the crop field near Nagarahole forest, photo: mahaveera198





Lighting at crop field near Metikuppe village. Photo: vishwanatha HR



Individual solar fence & lighting at crop land near Metikuppe village. Photo: vishwanatha HR

- GUN

Farmers are confuse which mitigation method have to use and when, because elephants are very clever and hard(Prithviraj Fernando et al,2008), and are afraid to only for gun but all the farmers are not having gun, only 31.8% of people are having the gun among forest fringe villages and using for mitigation purpose, It is costly and to take permit farmers have to spend lot of money.

TABLE NO 3

SL NO	Sampling villages of 0 to 1 km from the forest	1	2	3	4	5	6	7
		Methods for reducing elephant depredation suggested by villagers during field survey 2014						
		Trench	Electric fence	Patrolling	Wall	Lighting at park boundary	Chase away	Improve elephant habitat
1	Utthenahalli	9	7	3	3	4	2	4
2	Muddanahalli	7	6	3	4	4	1	5
3	Alalur	4	5	2	5	3	2	8
4	Abbalathi	3	7	3	3	3	3	6
5	Kogilavaadi	9	8	3	4	2	2	7
6	Habatoor	5	6	3	4	4	1	5
7	Malangi	7	6	3	5	3	4	4
8	Muttur	6	6	2	6	3	2	6
9	Lingapura	7	9	5	5	2	5	7
10	Kurubarahosalli	8	9	3	4	4	3	8
11	Veeranahosalli	6	5	3	2	3	2	9
12	Billenahosalli	8	8	3	4	5	6	8
13	Konanahosahalli	7	9	2	7	3	4	9
14	Neralakuppe	9	8	3	6	3	3	8
15	Uduvepura	9	8	3	4	5	3	9
16	Bharathavaadi	8	8	3	6	4	2	7
17	G M Halli+Haadi	26	21	4	21	6	3	12
18	Siddapura+Kallahatt y	26	19	5	20	7	3	14
19	Agasanahundi + Colony	28	17	5	19	8	5	18
20	Metikuppe + Haadi	36	22	5	17	9	7	27
Total	Out of 327 Respondents	228	194	66	149	85	63	181

Chart No 2

TABLE NO 4

Perception of Respondents on Mitigation Methods at the Fringe villages of Nagarahole Forest												
	Tree top huts	Shouting	Gun	Crackers	Torch light	Alarm	Lighting at the crop field	Drumming	Chase away	kerosene dipped throwable cloth fire ball	Fire	Guarding
Utthenahalli	10	10	4	8	10	3	2	9	4	3	8	9
Muddarahalli	10	10	3	9	10	2	3	9	6	4	8	9
Alalur	12	12	3	11	12	3	4	12	5	4	9	12
Abbalathi	10	10	4	10	10	2	5	10	4	2	10	10
Kogilavaadi	12	12	3	12	12	3	5	12	5	3	12	12
Habatoor	13	13	3	12	13	3	4	13	6	5	10	13
Malangi	14	14	4	14	14	4	5	14	4	6	11	14
Muttur	15	15	5	15	15	6	4	15	8	4	12	15
Lingapura	14	14	3	14	14	4	5	14	7	2	9	14
Kurubarahosalli	13	13	3	12	13	6	6	13	9	4	12	13
Veerarahosalli	16	16	4	16	16	6	5	16	8	6	12	16
Billeshosalli	15	15	5	15	15	2	7	15	7	7	13	15
Korarahosahalli	18	18	5	18	18	5	8	18	9	8	16	18
Neralakuppe	17	17	6	17	17	5	7	17	7	9	14	17
Uduvapura	17	17	8	17	17	6	9	17	8	7	16	17
Bharathavaadi	15	15	6	15	15	5	5	15	6	5	13	15
GMHalli+Haadi	19	20	7	19	19	9	8	19	9	6	12	18
Siddapura+Kallahatty	26	26	7	24	26	8	9	26	11	9	14	26
Agasarahundi + Colony	23	23	9	22	23	12	12	23	16	13	14	23
Metikuppe + Haadi	37	37	12	32	37	14	15	36	25	14	16	37
Out of 327 Respondents	326	327	104	312	326	108	128	323	164	121	241	323
In%	99.69	100	31.8	95.41	99.69	33.02	39.14	98.77	50.15	37	73.7	98.77

PREVENTIVE METHODS FOR HUMAN ELEPHANT CONFLICT AT THE FRINGE VILLAGES OF NAGARAHOLE

Perception of Respondents on Mitigation Methods at the Fringe villages of Nagarahole Forest													
0		Tree top huts	Shouting	Gun	Crackers	Torch light	Alarm	Lighting at the crop field	Drumming	Chase away	kerosene dipped throwable cloth fire ball	Fire	Guarding
1	Utthenahalli	10	10	4	8	10	3	2	9	4	3	8	9
2	Muddanahalli	10	10	3	9	10	2	3	9	6	4	8	9
3	Alalur	12	12	3	11	12	3	4	12	5	4	9	12
4	Abbalathi	10	10	4	10	10	2	5	10	4	2	10	10
5	Kogilavaadi	12	12	3	12	12	3	5	12	5	3	12	12
6	Habatoor	13	13	3	12	13	3	4	13	6	5	10	13
7	Malangi	14	14	4	14	14	4	5	14	4	6	11	14
8	Muttur	15	15	5	15	15	6	4	15	8	4	12	15
9	Lingapura	14	14	3	14	14	4	5	14	7	2	9	14
10	Kurubarahosalli	13	13	3	12	13	6	6	13	9	4	12	13
11	Veeranahosalli	16	16	4	16	16	6	5	16	8	6	12	16
12	Billenahosalli	15	15	5	15	15	2	7	15	7	7	13	15
13	Konanahosahalli	18	18	5	18	18	5	8	18	9	8	16	18
14	Neralakuppe	17	17	6	17	17	5	7	17	7	9	14	17
15	Uduvepura	17	17	8	17	17	6	9	17	8	7	16	17
16	Bharathavaadi	15	15	6	15	15	5	5	15	6	5	13	15
17	G M Halli+Haadi	19	20	7	19	19	9	8	19	9	6	12	18
18	Siddapura+Kallahatty	26	26	7	24	26	8	9	26	11	9	14	26
19	Agasanahundi + Colony	23	23	9	22	23	12	12	23	16	13	14	23
20	Metikuppe + Haadi	37	37	12	32	37	14	15	36	25	14	16	37
Total	Out of 327 Respondents	326	327	104	312	326	108	128	323	164	121	241	323
	In %	99.69	100	31.8	95.41	99.69	33.02	39.14	98.77	50.15	37	73.7	98.77

TABLE NO 5

SL NO	Measures	Advantages	Disadvantages	Recommendation
1	Elephant resistant trenches	<ul style="list-style-type: none"> <li>• Semi-permanent</li> </ul>	<ul style="list-style-type: none"> <li>• Maintenance cost is very high</li> <li>• Construction cost is very expensive</li> <li>• It is suitable only for flat and dry terrain</li> </ul>	<ul style="list-style-type: none"> <li>• Recommendable for flat and dry area</li> </ul>
2	Electric fences	<ul style="list-style-type: none"> <li>• Semi-permanent</li> <li>• It is flexible</li> </ul>	<ul style="list-style-type: none"> <li>• Maintenance cost is high</li> <li>• Fixing casts is very costly</li> </ul>	<ul style="list-style-type: none"> <li>• Very recommendable</li> </ul>
3	Patrolling by forest guards	<ul style="list-style-type: none"> <li>• Cheap</li> <li>• Speedy Effect</li> <li>• Semi-permanent</li> </ul>	<ul style="list-style-type: none"> <li>• Un safe</li> <li>• Short term effect</li> </ul>	<ul style="list-style-type: none"> <li>• Greatly recommendable</li> </ul>
4	Translocation	<ul style="list-style-type: none"> <li>• Lengthy time result</li> <li>• Un sustainability</li> </ul>	<ul style="list-style-type: none"> <li>• Depends on administration choice</li> </ul>	<ul style="list-style-type: none"> <li>• Extremely recommendable</li> </ul>
5	Elephant Proof Wall	<ul style="list-style-type: none"> <li>• High-cost</li> </ul>	<ul style="list-style-type: none"> <li>• It is suitable only for flat and Dry terrain</li> </ul>	<ul style="list-style-type: none"> <li>• Recommendable for Flat area</li> </ul>
6	Railing Barriers	<ul style="list-style-type: none"> <li>• High cost</li> </ul>	<ul style="list-style-type: none"> <li>• Long-term effect</li> </ul>	<ul style="list-style-type: none"> <li>• Highly recommendable</li> </ul>
7	Mono cropping	<ul style="list-style-type: none"> <li>• Good for prevention</li> </ul>	<ul style="list-style-type: none"> <li>• Depends on farmers choice</li> </ul>	<ul style="list-style-type: none"> <li>• Vastly recommendable</li> </ul>
8	Lights at the forest boundary	<ul style="list-style-type: none"> <li>• Elephants are afraid of lights</li> </ul>	<ul style="list-style-type: none"> <li>• High cost</li> <li>• Must aware of electric accidents</li> </ul>	<ul style="list-style-type: none"> <li>• Recommendable for testing</li> </ul>



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