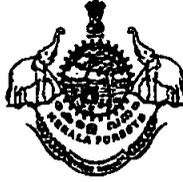


URGENT WSECTION

0035843



Vanapriya Forest Complex,
Paravattani, Thrissur - 680 005
☎ / Fax: 0487- 2423189
Email : ccf-cc.for@kerala.gov.in

Date: 09-12-2020

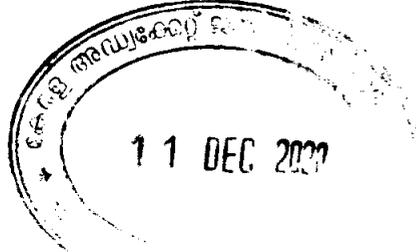
No.A2-3851/20

From

Chief Conservator of Forests
Central Circle, Thrissur

To

The Advocate General
Ernakulam, Kerala.



Sir,

Sub: - Kerala Forests and Wildlife Department -OA 77/2020-Suomoto proceedings initiated by the National Green Tribunal, Chennai - Submission of report by joint committee.- reg.

Ref: - 1. Order dated 05/06/2020 in OA-77/2020 of Hon'ble National Green Tribunal, Chennai.

2. Letter No-KFDHQ-2650/2020-CWW/WL8 dated. 22/06/2020 of Principal Chief Conservator of Forests & Chief Wildlife Warden, Kerala, Thiruvananthapuram.

Kind attention is invited to the subject and the references. Hon'ble National Green Tribunal, Chennai ordered vide reference (1) to constitute a joint committee to ascertain the real State of affairs and also the steps to be taken to protect Wildlife and minimize man animal conflict in future. It was directed to submit a factual and action taken report including the long term management plan to avoid such recurrences in future.

I was deputed vide reference (2) by Chief Wildlife Warden, Kerala, and on behalf of the committee, I am submitting the report prepared for mitigating man animal conflict with Special emphasis on Elephants and also for enhancing effectiveness of the protection of Wildlife from illegal killings. I request that the same may kindly be submitted before Hon'ble National Green Tribunal, Chennai.

Yours faithfully

9/12/2020

Deepak Mishra
Chief Conservator of Forests
Central Circle, Thrissur

G-09/12

Report on Protection of Wildlife & Human – Wildlife Conflict in Kerala
Submitted before Hon'ble National Green Tribunal, Southern Zone, Chennai in
Original Application No 77 of 2020

National Green Tribunal, Chennai bench has initiated a Suo moto proceedings vide OA-77/2020 on the basis of the news item published in The New Indian Express dated 3.6.2020 under the caption "Kerala Elephant tragedy: Another jumbo suspected to have been killed in similar fashion". The Honourable Tribunal has given direction to ascertain the real state of affairs and also the steps to be taken to protect wildlife and minimize man animal conflicts in future. Hon'ble Tribunal directed to appoint a joint committee comprising of a Senior Officer not below the rank of Chief Conservator of Forests deputed by Principal Chief Conservator of Forest, Wildlife, Chief Wild Life warden, Kerala, a Senior Officer from Wildlife Crime Control Bureau, Southern Region, Wildlife Warden, Silent Valley Division, Divisional Forest Officers, Mannarkkad and Punalur and the District Collector, Palakkad to go into the question and submit a factual and action taken report including the long-term management plan to avoid such recurrences in future.

As per Hon'ble Tribunal direction the Principle Chief Conservator of Forests and Chief Wildlife Warden, Kerala had deputed Chief Conservator of Forests (Central Circle) for the joint Committee. Accordingly, meeting was conducted by the Chief Conservator of Forests (Central Circle) Thrissur at 11 AM on 26.06.2020 and the following Officers attended the meeting.

- (1) Sri.Deepak Mishra, IFS, Chief Conservator of Forests (Central Circle), Thrissur
- (2) Sri.Samuel Vanlalngheta Pachuau, IFS, Wildlife Warden, Silent Valley Division
- (3) Sri.Arjun Pandyan, IAS, Sub Collector, Ottappalam (Representative of District Collector, Palakkad)
- (4) Sri.K.K.Sunil Kumar, Divisional Forest Officer, Mannarkkad
- (5) Sri.Shanavas, Divisional Forest Officer, Punalur
- (6) Sri. A. Madivanan, Assistant Director in Charge, WCCB, SRO, Kochi.

The Chief Conservator of Forests gave a background of the incidents which occurred at Mannarkkad and Punalur Divisions and the case under consideration. Divisional Forest Officer, Mannarkkad explained briefly the case of the death of the pregnant elephant. Divisional Forest Officer, Punalur also explained the details of the case in which an elephant had died in his jurisdiction. Both Divisional Forest Officers informed that very good assistance is being received from the part of the Police personnel for ongoing investigation. The Chief Conservator of Forests

made a suggestion in amending Wildlife Protection Act for ensuring maximum conviction in wildlife cases. After the detailed deliberations, the following decisions were taken.

- (1) Since a detailed report requires more study and consultation with various stakeholders, Interim report may be submitted before the Hon: National Green Tribunal, Chennai on or before 10.07.2020.

(Action taken: Interim report submitted to NGT through Advocate General on 07.07.2020)

- (2) Case histories and immediate actions that have been taken in these 2 areas i.e. Mannarkkad and Punalur to sanitize the forest fringes and ensuring protection will be compiled by Wildlife Warden, Silent Valley Division and submit to Chief Conservator of Forests (Central Circle) on or before 03.07.2020.

(Action taken: Report submitted on 1.7.2020)

- (3) Inputs from WCCB and District Administration would also be taken to be part of this report.

- (4) Chief Conservator of Forests (Central Circle) will then collate all these inputs and also obtain state level interventions that have been taken up for protection from Head Quarters. All these details would then be compiled and submitted to Government as an Interim Report to be submitted to National Green Tribunal.

(Action taken: Interim report submitted to NGT through Advocate General on 07.07.2020)

- (5) It was also of the opinion of the Committee that ensuring long term protection and mitigation of human wildlife negative interactions requires holistic understanding of not only the ecology of the area but also the attitude and behaviour of the people affected by such negative interactions. In this regard it was decided to actively engage and get inputs from learned Officers from conflict prone areas, Scientists / Institutions working on animal behaviour and conflict mitigation, Inputs from local people affected by wildlife etc. Since this will take more time and effort given Covid-19 restrictions and closure of many offices as part of lockdown, the Committee decided to request Hon: National Green Tribunal to grant more time to submit a detailed perspective on management of human wildlife conflicts in the State of Kerala. Hon'ble Tribunal generous to grant extra time to submit final report.

As part of the process the division level Human Elephant Conflict mitigation plans from all the divisions experiencing human wildlife conflicts were collected to suggest local level remedies that can be compiled at the State level.

INTRODUCTION

Human-Wildlife conflict is one of the major concerns in the field of Wildlife management and biodiversity conservation. Human Wildlife Conflict is any sort of negative interaction between humans and wild animals. The damages resulting from human animal conflict can threaten the conservation of threatened species and influence the public opinion on the species involved in conflict. Like in most part of the country, the growing Human Wildlife conflict is a major issue of concern in the state of Kerala too. Climate change, anthropogenic disturbances, developmental activities, habitat fragmentation, habitat loss and population increase all contribute to Human Wildlife conflict.

The state of Kerala is having forest cover of about 29% (<http://www.kerenvs.nic.in/Database>), and Human Wildlife conflict is reported along the edges of our forest areas and on occasions further into human settlements too. The forest fringes of Kerala are estimated to contain a human population of about 6 lakhs. The rising interaction between people and wildlife in these areas also increases crop damage, property damage, human casualties and wild animal casualties. As per the records of Forest Department of Kerala there is a long list of animals for which people demanded compensation: Elephant, Wild Pig, Bonnet macaque, Snakes, Leopard, Tiger, Sambar deer, Wild Dog, Gaur, Spotted Deer, Porcupine, Malabar Giant Squirrel, Peacock, Jackal, Mongoose, Flying Squirrel, Sloth Bear, Barking Deer, Squirrel, Honey Bee, Civet, Rock Python, Jungle Cat, Pangolin.

Elephant, Wild pig, Bonnet macaque and snakes top the list for conflict followed by predators like Tiger, Leopard and Wild dog. Other herbivores like Sambar deer, Chital and Gaur contribute to crop depredation depending on the proximity to forests especially Protected Areas. Most of the conflict is caused by Elephants and they contribute more than 50 % of the conflict cases. Most of the economic loss and also the loss of life are caused by elephants and this conflict is now widespread over the whole of the state. Conflicts by other animals are mainly local in nature. This report is therefore mostly concerned with the evaluation of mitigation measures for Human Elephant Conflict and suggestions to improve various measures so that the conflict can be effectively dealt with.

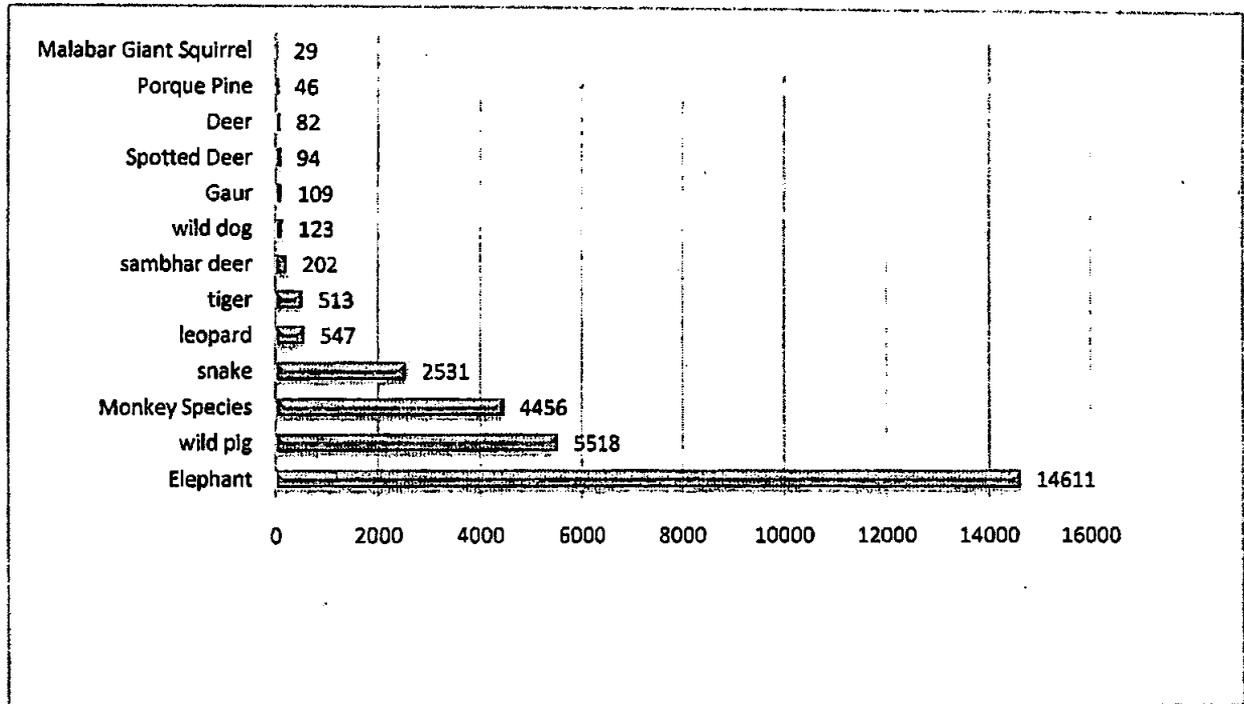


Fig: Human wildlife conflicts from 2013 to 2018/2019 in Kerala (Source: Kerala Forest Dept.)

Human – Elephant Conflict

The Asian elephant (*Elephas maximus*) is an endangered animal belonging to Appendix-1 of CITES and is included in the schedule 1 of Wildlife Protection Act, 1972. Kerala holds the third largest population of Wild Elephants in India and the population is distributed over four elephant Reserves in the state.

Around 15,000 cases out of the almost 29,000 conflict incidents in Kerala is attributed to Elephants as per the records of Kerala Forest Department. Human-Elephant conflicts result in Human Casualties, Elephant Casualties, Injury, Property damage, crop damage and live stock casualties. Elephants are the prime species involved in crop raiding and Plantains, Coconut, Arecanut, Coffee, Paddy and Tubers are the major crops raided by the species. Incidentally, Elephant cause the most damage in all these crops when compared to other crop raiders. Elephants are also the species that cause most number of human deaths and injuries among wild mammals.

The Human-Elephant conflict is expected to increase in the coming years and more than half the expenditure incurred by the Project Elephant goes for the Human elephant conflict mitigation (ETF, 2010).

Habitat fragmentation due to developmental activities and linear intrusions, the larger area requirement of the species for movement, rising population of humans, farming of palatable crops like plantains near the forest fringes etc are the main reason behind rising conflict between humans and elephants. Presently used mitigation methods include trenches, solar fencing, elephant driving forces, guarding, biological fences etc.

Human – Wild Pig Conflict

Wild Pig (*Sus scrofa*) is the species to cause second most crop damage after Elephants with over 5,500 incidents in the past 6 years (2013-19 period). This species has managed to adapt well in the human altered landscapes and live along with humans. This also makes the most common agricultural pest among Wild Animals. Plantains and Tubers are the major crops raided by Elephants.

The ability of the species to adapt to human habitations is the major reason for the conflict. Fencing the farm areas, vocal deterring and guarding the farmlands are the mitigation methods that can be adopted.

Human – Monkey Species Conflict

Bonnett Macaque (*Maccaca radiata*) is the major monkey species involved in human-monkey conflict in Kerala. They are efficient in using both arboreal and terrestrial habitats, and easily adapt to human altered landscapes. They raid palatable crops including Plantain and Coconut. The major reason behind Human-Monkey conflict is habitat fragmentation, monkey troops in the forest edges intruding into and adapting to human habitations, people feeding monkey troops and there by troops getting habituated to people etc.

The mitigation measures include prohibiting feeding of monkeys by public, sterilization of breeding individuals etc. Translocation is also employed at times but the effort that needs to be put is high due to the large number of individuals in monkey troops.

Human – Wild Carnivores Conflict

The major wild carnivores involved in conflict with humans are Leopards (*Panthera pardus*) and Tigers (*Panthera tigris*). To a very less extent Wild dogs/Dholes (*Cuon alpinus*) are also involved. Tigers and Dholes are listed endangered while the leopards are vulnerable. The major form of conflict involves Cattle lifting, Dog lifting and at times human casualties too. Major reasons behind Human-Big Cat/carnivore conflict includes habitat degradation, fragmentation, transient individuals & injured individuals moving into human settlements and specially with

respect to Leopards, its efficiency in adapting to human habitation and living along side people. The availability of large variety of domestic animals, stray animals including cattle, goat and dogs are also a major factor that triggers Human-Big Cat conflict.

Mitigation methods include translocation (into captivity when it comes to injured individuals), Well guarded enclosures for pets and livestock.

Based on the available data it can be concluded that Elephants are the animal species that are involved in majority of the human wildlife conflict and special attention should be taken care in this regard. More focus should be given to mitigate Human-Wildlife Conflict to address the public concerns in general regarding Human Wildlife conflict and also to strengthen efforts for conservation of wild animals. The present report is mainly concerned with the Human Elephant Conflict since this is more prominent and widespread in Kerala.

Overview of Present Mitigation Efforts and Suggestions for Improvement

Kerala Forest Department is making earnest efforts to manage the Human Elephant Conflict situation to best of its abilities subject to various resource and manpower constraints. Human Elephant Conflict is a complex issue and there is no silver bullet for its resolution. Combination of methods/ strategies is used for management of Human Elephant Conflict and elephants also learn and evolve their behavior to surmount the obstacles. New ways and strategies are therefore to be constantly evolved and tried. Most of the strategies being suggested here have already been implemented or are being tried in the field in the state or elsewhere. We here attempt only to list suggestions on various strategies which can be used for the mitigation and management of Human Elephant Conflict and based on feedback received from the field staff and experts, ways to improve the effectiveness of various strategies being tried are suggested here:-

1. Expanding the Habitat:-

- a) **Relocation of Enclosure / Habitations:** - In many parts of Kerala Forests, enclosures within the forest areas exist. The households residing there have different land titles including forest rights. This has led to the fragmentation of the elephant habitat and the ratio of the forest cultivation boundary to forest area increases resulting in increase in incidences of crop raiding by the elephants in such areas. The persistent depredations of the agricultural crop have put the livelihood of the inhabitants of such enclosures in peril. Many of such people are willing for relocation.

In Wayanad District people were relocated from Arakunji, Golur, Ammavayal, Eswarakolli, Vellakod and Kottankara settlements and most of the people from certain other settlements such as Chetty - Alathur, Kurchiat, Narimundakolli, Pilakanu and Puthur - Manimunda have also relocated.

The relocation of such enclosures will reduce the Human Elephant Conflict and due to the subsequent re-wilding of such places, these areas will become viable elephant habitats. Kerala Forest Department is attempting to continue and speedup this activity by taking the implementation of Wayanad relocation project further and also by identifying more such enclosure settlements for relocation. The identified and prioritized settlements are:

1) Shenduruny WLS

Sl No	Division	Name of Settlement	Extent (Ha)	Total Number of families	Eligible Families	Total amount required (in lakhs)	Remarks
A. Protected area							
1	Shenduruny Wildlife	Rosemala	99.15	204	344	5160.00	
		Kattilappara	11.60	33	54	810.00	
		Total	110.75	237	398	5970.00	

2. Marayoor Forest Division

Sl No	Division	Name of Settlement	Extent (Ha)	Total Number of families	Eligible Families	Total amount required (in lakhs)
B. Outside Protected area						
1	II. Marayoor	Puthuvettu	5.30	15	23	345.00
2		Edakkadu SC Colony	11.40	17	26	390.00

3		Edakkadu Colony	1.86	21	32	480.00
4		Karadi china para	45.66	12	18	270.00
5		Punavayal	13.09	20	30	450.00
6		Kundakkadacu	1.41	7	11	165.00
	Sub total		78.72	92	140	2100.00

3. Wayanad North Forest Division

Sl No	Division	Name of the Settlement	Extent (Ha)	Total number of Families	Eligible families	Total Amount required (in Rs lakhs)
B.	Outside Protected Area					
1	III. North Wayanad	Pancharakolly	0.81	1	2	30.00
2		Maniyankunnu	1.37	1	2	30.00
3		Kalliyottukunnu	1.21	1	2	30.00
4		Kalliyottukunnu	0.81	1	2	30.00
5		CRP Kunnu	6.86	47	70	1050.00
6		Muriyanthadam	0.81	1	2	30.00
	Sub total		11.87	52	80	1200.00

4. Kasargode Forest Division

Sl No	Division	Name of the Settlement	Extent (Ha)	Total number of Families	Eligible families	Total Amount required (in Rs lakhs)
B.	Outside Protected Area					
1	IV. Kasargod	Kaneri	2.25	1	2	30.00
2		Karadukka, Kottamkuzhy	0.30	3	5	75.00
3		Adoo rMuchaamthully	1.10	2	3	45.00
4		Ottamala	1.25	4	6	90.00

Sl No	Division	Name of the Settlement	Extent (Ha)	Total number of Families	Eligible families	Total Amount required (in
5		Thumbadukka	2.00	4	6	90.00
6		Kamballur	5.00	16	24	360.00
7		Vallakkadu	2.70	3	5	75.00
8		Balavathadukka	2.43	5	8	120.00
	Sub total		17.03	38	59	885.00

Kerala Government has already awarded in principle approval for the resettlement work and has approved the financial outlay for the above works. These activities should be continued and based on ecological significance of the area, some more settlements should be identified and their inhabitants should be motivated to accept resettlement package and resettlement should be completed in a time bound manner.

At present such resettlements are being carried out as per modified guidelines of NTCA. Each family is given Rs. 15 lakhs as compensation in lieu of the land rights surrendered. However, in case of many settlements situated deep inside forest areas the inhabitants are not willing to accept monetary compensation for moving out of the habitation. For such people, their livelihood is dependent on cultivation and it will be difficult for them to survive without it. Many more people will be willing to come out from deep inside the forests if alternate land along with financial help for the development of same for cultivation is provided to them. In a State like Kerala, where population density is very high finding common land for distribution is not possible. The only feasible solution is the resettle such people by resettling them on degraded forest land on forest fringes, which have substantially lesser ecological significance. The existing guidelines under Forest (Conservation) Act 1980 do not allow the diversion of forest land for rehabilitation of people according to Para 1.16 of comprehensive guidelines under Forest (Conservation) Act 1980. If the diversion of forest land is essentially required for the rehabilitation of persons belonging to Scheduled Tribes, Scheduled Casts and others who have to be shifted from core zone of the National Park, Sanctuary on reserve then such cases are to be considered as special cases and permission for diversion may be granted. Most of the natural forest areas of the

territorial divisions are rich habitat for the elephants and the Human Wildlife Conflict are significantly higher in forest areas with territorial divisions as compared to the protected areas. It is submitted that Hon'ble Tribunal may kindly direct Govt. of India to reconsider the guidelines and permit the rehabilitation of settlements/ enclosures existing in the interior forest area to the fringe forest areas having low ecological value. The existing plantation of exotic trees species or monoculture plantation may be utilized for this.

- b) **Relocation of Estates:** - There are many estates situated within the forests. Cultivation of cash crops such as Rubber, Cardamom, Coffee, Tea and Spices is the main business. Labourers working in the estates either reside within the estates or travel to and from for the work inside the forest roads situated in elephant habitats. Department has formed strategy of acquiring few such large holdings by payment of adequate compensation to the owners. The estates identified in the first phase are as follows:-

PRIVATE ESTATES TO BE ACQUIRED under RKDP

Division	#	Name of the Estates/ enclosure	Extent (Ha)
Shendurney WLS	1	Kallar	291.2000
	2	Rockwood	152.7000
		Sub Total	443.9000
Periyar East Division	3	Downton/Pachakkanam Estate	208.7497
		Sub Total	208.7497
Silent Valley NP	4	Noor Acre KP Estate	40.4690
	5	Mannarkkad Rubber estate	101.1740
		Sub Total	141.6430
		Total for PAs	794.2927
Thiruvananthapuram Forest Division	6	Mahaveer Estate, Bonacaud	498.1295
		Sub Total	498.1295
Wayanad South Forest Division	7	CR Estate (Thariyode)	57.1790
		Sub Total	57.1790
Wayanad North Forest Division	8	MakkimalaSaroja Estate	34.3300
	9	MalanthottamThirunally	6.8804

	10	Edayoorthirunally	0.2266
			2.9293
			0.3561
	11	Banasura Plantation, Vellamunda	6.0625
	12	Narippara	0.3927
			8.9100
	13	Cherumunderi	40.4800
		Sub Total	100.5676

It is recommended that the prioritized estates should be acquired in time bound manner and in future also more such areas should be identified and acquired to minimized Human Elephant Conflict.

- c) **Acquisition / Maintenance of Elephant Corridors:-** Elephants are in general long ranging animals – their home range being very large and the daily and seasonal migrations is important for the proper functioning of the environment and ecosystem of the forest areas. Corridors are forest areas which connect the two large habitats and which enable the elephants to move from one habitat to other. In the last many years due to encroachment of habitation in the forest areas many of such corridors are blocked for elephant movement. When the elephant herds try to negotiate such areas intense human elephant conflict is caused. Further blockage of such corridors force the elephant herds to be confined to small areas of the habitat leading to degradation of the habitat and straying of herds to the periphery in search of newer migration rates. In Kerala seven important corridors have been identified. The details of such corridors and action needed for restoration is as in the following table:-

Identified elephant-corridors in Kerala

Sl. No.	Name of Corridor	Division under which the corridor falls	Remarks
1	Begur – Brahmagiri (Inter-State Corridor)	Wayanad WLS with Brahmagiri WLS &Nagarhole TR (Karnataka)	Land to be acquired

2	Thirunelli- Kudrakote (State Corridor)	Wayanad (N)	Secured and notified
3	Kottiyur – Periya (State Corridor)	Kannur, Wayanad (N)	Land acquisition in progress and is to be completed. More areas to be acquired to secure the corridor completely
4	Periya at Pakranthalam (State Corridor)	Wayanad (N)	Land to be acquired
5	Nilambur – Appankappu (State Corridor)	Nilambur North & South Divisions	Land to be acquired
6	Nilambur Kovilakam- New Amarambalam (State Corridor)	Nilambur North & South Divisions	No acquisition needed
7	Mudumalai – Nilambur via O' Valley (Ouchterlony Valley) (Inter-State Corridor)	Nilambur North Forest Division and Mudumalai Tiger Reserve (TN)	No acquisition needed on Kerala side

It is recommended that earnest efforts be taken to secure all of the above corridors. The corridors listed above are the major corridors but many of the minor corridors also exist in the forests which connect one forest area to the other. Elephants frequently use these paths for the daily or seasonal migrations but due to land use change in last few decades these corridors are not easily accessible to the elephants which enhances the conflict issues in these and neighboring areas. All such corridors may be identified by careful study and efforts should be made to secure these as well.

4. Increasing Efficiency of Physical Barriers

The main barriers utilized in the State to prevent the entry of elephant herds habitation are:

- a) Elephant Proof Trenches
- b) Solar Power Fencing

- c) Elephant Proof Walls
- d) Rail Fence
- e) Crash Guard Rope Fence

The details of the physical barrier structures constructed till 31/03/2018 are as follows:

**Major Preventive Structures constructed to Mitigate Man-Animal Conflict
(as on 31/03/2018)**

Circle	Preventive structures (in KM)					
	Solar Fencing	Elephant Proof Trench	Elephant Proof Wall	Stone pitched Trench	Bio Fence	Kayyala
Northern	589.85	196.57	149.27	0.26	0	5.12
Estern	381.34	26.95	6.99	1.18	0	49.29
Central	218.48	12.58	0.34	1.08	0	6.45
High Range	118.52	5.41	0.45	0	24.22	13.09
Southern	269.51	75.41	6.44	1.33	2.45	155.02
WL Palakkad	331.91	249.66	12.38	2.18	0	0.04
FDPT	104.35	41.71	1.14	0.27	0	18.17
ABP	79.65	10.11	0	0	0	1.64
Total	2093.61	618.40	177.01	6.30	26.67	248.82

Source:- Administration Report 2017-18, Kerala Forest Department

- a) **Elephant Proof Trenches** – This is the earliest known physical barrier adopted in several parts of the country facing Human Elephant Conflict. The construction of trench requires heavy investment and the structure requires periodic maintenance. This is not very effective in high rainfall areas, due to their extreme vulnerability to soil erosion.

In the State, 624.70 km of Elephant Proof Trenches have already been constructed. Many of them are ineffective due to non maintenance. In most of the places the Elephant Proof Trench is fortified with Solar Power Fence but due to lack of annual maintenance both the structures are not effective.

It is recommended that a complete stocktaking of Elephant Proof Trenches must be done by listing all such structures in next 3 months. Each of such structures should be verified by officers of the level of Range Officers and above. The present condition of all such trenches should be ascertained and documented. The maintenance requirements of these structures to be found and proper decision must be taken as to whether to renovate or maintain these structures or to abandon these in favour of more effective structures.

- b) **Solar Power Fence** – This is one of the most popular mitigation measures and about 2093 km of the forest people interface has already been covered by erection of Solar Power Fence. This does not require very high initial investment but need to be maintained almost on daily basis. Forest Department usually constructs the power fences but is not able to maintain these due to financial and manpower constraints. Therefore, many of such structures are not functional. Whenever the Human Elephant Conflict reaches high intensity, Solar Power Fence is either constructed or maintained but within short time due to non maintenance the structure becomes non effective. The only solution is to develop a robust institutional mechanism for the maintenance of Power Fencing. The maintenance of Power Fences must be entrusted with the community. Local Self Government Institutions should be actively involved in the periodic maintenance activities. The correct technical specification must be followed while constructing the Power Fence. Regular maintenance of batteries, energizer and other components must be ensured. One of the reasons for non maintenance of these structures is paucity of funds for maintenance. Sufficient funds should be provided for maintenance of already existing structures. In fact the majority of the funding earmarked for mitigation of the Human Elephant Conflict should be spent on maintenance and new structures must be done only after all the old structures are made functional.
- c) **Elephant Proof Wall** – These are not common structures used for mitigation of Human Elephant Conflict. The implementation cost is very high (Rs. 140 lakhs /km) and the construction requires large amount of rubble which is to be taken out from quarries thereby creating large adverse. Impact on the fragile environment of Western Ghats. If constructed properly these can effectively prevent elephants from entering habitations but the utility of these structures are rather limited in Kerala. These structures are to be used only in very high conflict zones and after due consideration to the local site and soil conditions.
- d) **Rail Fence** – These fences are built with steel railway tracks granted deep in to the ground. Between two railway tracks a thick wooden poles are also dug into the ground. They are then bound by five strands of very thick steel cables horizontally along the poles. At present rail fence is being tried in Kerala in Palakkad and Wayanad Districts.

If design is suitably modified to site & specific requirements such structures are found to be highly effective in preventing entry of the elephants in habitation.

- e) **Crash Guard Rope Fence** – This new mitigation measure was tried in Mankulam Division of High Range Circle and the structure was found reasonably effective in preventing elephants from entering the habitation. ISMC series galvanized channels are placed in pits of 90cm x 90cm x 90cm at 4m interval and stabilized with reinforced cement concrete. In each ISMC channel five holes are made through which 5 strands of steel ropes pass, which are then tied to anchor blocks at both ends. At present proposals for constructing 46km of such fences in Kerala are at various phases of implementation.

Recommendations for Improving the Effectiveness

- a. The physical barriers at each place must be supplemented with other prevention mechanism to make them more effective.
- b. Each of the barrier structure must be inspected on verified by forest officers for effectiveness and the required repairs must be carried out timely. Range Officers must monitor all such structures once in every 2 months and Divisional Forest Officers should monitor once in every 3 months.
- c. Sufficient budget provision should be made for maintenance of existing structures. New structures should be avoided. Funds from Panchayath and other line Departments should also be tapped for this.
- d. The responsibility of the maintenance of the barriers should be entrusted with beneficiaries. Institutional mechanism for regular maintenance and repair must be developed with the collaboration and participation of the local people through VSS or LSGIs.
- e. Solar Power Fence, which is the most popular barrier in the state, requires constraint maintenance. One person should be engaged for every 2km of such line for checking battery, energizer and other equipments. Regular cleaning of weeds should also be done around Solar Power Fence. A full maintenance schedule should be developed and followed for each Solar Power Fence.
- f. Elephants adapt to the new barriers and usually after a gap of time learn to find weaknesses / gaps and then exploit these to breach the barriers to raid crops. The department will have to constantly innovate and develop new designs. One such

solution is hanging Solar Power Fence, which will reduce even the effort required for maintaining a conventional Solar Power Fence. These will now be tried and based on performance appraisal of such structures conventional Solar Power Fence should be slowly replaced with hanging Solar Power Fence.

5. Jan Jagrata Samithi:-

In order to involve the local elected people's representative to Panchayaths in the effort of mitigating Human Wildlife Conflict, a Government order regarding constitution of Jan Jagrata Samithi was issued as GO (Rt) No. 51/2017/Forests dated 07.02.2017. The constitution of such Samithi is as follows:-

1.	President Grama Panchayath / Chairman Municipality	Chairman
2.	Vice President Grama Panchayath / Vice Chairman Municipality	Vice Chairman
3.	Local Range officer / Dy. Range Officer	Convener
4.	Member District Panchayath	Member
5.	Member Block District Panchayath	"
6.	Agriculture Officer	"
7.	Veterinary Surgeon	"
8.	Village Officer	"
9.	Ward Members Grama Panchayath Councilors Municipality	"
10.	President of VSS/EDC	"
11.	Beat Forest Officers	"
12.	3 Farmers Nominated by DFO	"

Duties and Responsibilities

1. To act as bridge between people and Forest Department in conflict areas.
2. To discuss and advise Forest Department about appropriate mitigation measures for Human Elephant Conflict.
3. To meet once in 3 months and submit the recommendations about mitigation measures to Divisional Forest Officers.
4. To inform the Department about functioning and maintenance requirements of the

barrier structures such as Solar Power Fence, Elephant Proof trench or Elephant Proof Walls and also suggest ways for proper maintenance of such structures.

5. During conflict situation help the Forest officials in their operations.
6. To be a partner of the Forest Department in generating awareness among farmers about planting crops, unpalatable to elephants.
7. To make sure that the SMS system or early warning system is properly functioning in areas of Human Elephant Conflict.
8. The minutes of such meetings should be received by Divisional Forest Officers every 6 months and the remarks on these should be submitted to APCCF (F L & R) for further action.

Jan Jagrata Samithis in all of the high conflict areas have been constituted. This institution started functioning well in many localities but due to the COVID situation this year, meetings could not be held timely and so after the pandemic situation is eased out these institutions must be revived. In many places Panchayath level functionaries and local MLAs have taken keen interest and tried to solve the local level issues. This initiative need to be strengthened. Local level representatives can be sensitized towards the issues related to Human Elephant Conflict and the misconception about the wildlife management issues can be cleared through this institution. Such meetings will formalize the exchange of ideas between the department and local people and better site specific solutions will emerge. It is recommended that DFOs should also attend at least two meeting of Jan Jagrata Samithi in a year as special representative. In many places many District Level / Block Level and Grama Panthayaths have funded the mitigation efforts especially the construction of Solar Power Fences. The same should be encouraged by Government thorough enabling orders by making this activity as part of ongoing schemes/ programmes of the State and Central Governments.

6. Rapid Response Teams / Primary Response Teams

To deal with ever increasing conflict situations in the state, Government have constituted Rapid Response Teams as per GO (MS) No.07/2012/Forests dated 15.02.2012. The details are as follows:

Sl.No.	Location of the RRT (HQ)	Range officer in charge of the RRT	Area of Operation
1.	Kozhikode (Thamarassery)	Range Forest Officer, Thamarassery	Kozhikkode District
2.	Mannarkkad (Mannarkkad)	Range Forest Officer, Mannarkkad	Mannarkkad Range, Bhavani Range and Western Slopes of Agali Range
3.	Peppara (Peppara)	Range Forest Officer Peppara	Thiruvananthapuram District
4.	Sulthan Batheri (Sulthan Batheri)	Asst. Wildlife Warden, Batheri	Wayanad WL Division and Chedleth Range of Wayanad South Division
5.	Kannur (Thaliparambu)	Range Forest Officer, Thaliparambu	Kannur District
6.	Palakkad (Olavakkode)	Range Forest Officer, Olavakkode	Nemmara and Palakkad Forest Division and Parambikulam TR
7.	Nilambur (Nilambur)	Range Forest Officer, Nilambur	Malappuram District
8.	Ranni (Ranni)	Range Forest Officer Ranni	Alappuzha District, Konni and Ranni Forest Divisions

Out of this, no staff has been sanctioned for the RRTs in Mannarkkad and Peppara while one Deputy Range Forest Officer only has been sanctioned for the Wayanad (Sulthan Batheri) RRT. Over a period of time, Human Animal Conflict issues are spreading to new areas. In order to address this field requirement, small teams are constituted by pooling field staff from the already depleted strength of the adjoining forest areas. Such temporary Teams are operating in Kasargode, Kalpetta, Malayattoor, Munnar, Peerumedu and Punalur.

In order to effectively meet this requirement, it is necessary to strengthen the above 8 RRTs and also establish regular RRTs at Kasargode, Kalpetta, Attappadi,

Chalakkudy, Munnar, Peerumedu and Punalur. These RRTs are to be manned by properly trained forest officers lead by the Deputy Range Forest Officer. In addition, mazdoors skilled in catching snakes, scaring away elephants and otherwise handle the straying animals will be engaged based on the field requirements. A proposal for that has already been submitted by Chief Wildlife Warden to the Government.

RRTs will be located at the following 15 Sites. They will function under the Territorial / Wildlife Range Forest Officer and will have the territorial areas of operation as shown below:

Sl. No.	Location of RRT	Controlling RFO	Territorial Area of Operation .
1.	Kasargode	RFO, Kasargode	Kasargode District
2.	Kannur	RFO, Kannavam	Kannur District
3.	Kozhikkode (Thamarassery)	RFO, Thamarassery	Kozhikkode District
4.	Wayanad (SulthanBatheri)	RFO, Muthanga	Wayanad WL Division and Chethalath Range of Wayanad South Division
5.	Kalpetta	RFO, Kalpetta	Wayanad North, Kalpetta and Meppapdi Ranges of Wayanad South Division.
6.	Nilambur	RFO, Nilambur	Malappuram District
7.	Mannarkkad	RFO, Mannarkkad	Mannarkkad Range, Bhavani Range and Western Slopes of Agali Range.
8.	Attappadi	RFO, Attappadi	Agali Range and Attappady Range within Attappady area.
9.	Palakkad	RFO, Olavakkode	Nenmara and Palakkad Forest Division and Parambikulam Tiger Reserve.
10	Chalakkudy	RFO, Paryaram	Thrissur District and Malayattoor Forest Division

11.	Peerumedu	RFO, Azhutha	Periyar East, West and Kottayam Forest Division
12.	Munnar	RFO, Munnar	Munnar, Marayoor, Mankulam Forest Division and Munnar Wildlie Division
13.	Ranni	RFO, Ranni	Alappuzha District, Konni & Ranni Forest Divisions
14.	Punalur	RFO, Anchal	Kollam District
15.	Peppara	RFO, Paruthippally	Thiruvananthapuram District

Rapid Response Team will:

1. Carry out regular perambulation in areas vulnerable to depredation of crops by elephants, wild boars, gaurs and other wild animals; inspect the condition of barriers erected and submit fortnightly report to the DFO / Wildlife Warden.
2. Monitor the movement of the problematic wild animals, including the effective functioning of Early Warning Systems and provide alerts to the local public.
3. Carry out rescue and rehabilitation operations of the injured or abandoned animals.
4. Camp at problem sites on the instructions of the Controlling RFO, till the problem situation is adequately addressed.
5. Co-opt the services of Veterinary Doctors and undertake radio collaring and translocation of wild animals, as ordered by the Chief Wildlife Warden.
6. Mobilize the presence of Police in required numbers to control the crowd.
7. Co-ordinate the activities of Jana Jagratha Samithies.
8. Verify applications for compensation / ex-gratia payments for wildlife attacks/damages.
9. March or halt as per the orders of the controlling RFO.

In order to immediately and effectively respond to the field problems and crisis, every RRT will be equipped with the following:

1. Especially designed/modified four wheel drive vehicle which will carry the persons as well as specialized equipment.
2. Mobile Wireless sets and Walkie-Talkies.
3. Tranquilizing guns with sufficient supply of drugs.
4. Cages for transporting problematic animals that are captured.

5. Emergency lights, torches, snake catching equipment etc.
6. Protective gears, life saving equipment etc.
7. Microphone system for making announcements / instructions to the public.

Staff Requirement

Each RRT will be headed by a Deputy RFO and depending on the extent of area covered and the intensity of the case will have 2 to 4 Section Forest Officers, 8 to 16 Beat Forest Officers, 3 to 6 Forest Watchers and one Driver each. Requirement of the complement of staff will be matching with the intensity of the problem, ie, 1-4-16-6-1 (Deputy RFO-SFO-Forest Watcher-Driver) for very sensitive areas, 1-3-12-4-1 for sensitive areas and 1-2-8-3-1 for moderately sensitive areas. After accounting for the already sanctioned strength available, the additional requirement of the staff is as follows:

Additional Staff Required

Sl. No.	Post	Required Strength	Present Strength	Addl. Post to be created	Remarks
1	Dy. Range Forest Officer	15	6	9	
2	Section Forest Officer	37	10	27	
3	Beat Forest Officer	148	31	117	
4	Forest Watcher	52	7	45	
5	Driver	15	9	6	

The following suggestions are offered to make the functioning of Rapid Response Teams more effective.

- A. The additional requirement of staff as indicated above should be approved.
- B. Each Rapid Response Teams should have a dedicated and well equipped vehicle.
- C. Each Rapid Response Teams should have a camping place.
- D. All the required tools/implements must be made available to them. These tools implements must be kept in a well maintained tool room.
- E. All the staff working in Rapid Response Teams must be trained for the techniques to be adopted for dealing with Human Elephant Conflict situations.
- F. Standard Operating Procedure for dealing with conflict situations must be finalized and made available to Rapid Response Teams.

- G. Range officers and Divisional Forest Officers in charge of Rapid Response Teams must review the performance of Rapid Response Teams on monthly basis and then submit the report to Circle Officers.

7. Primary Response Teams

In each conflict hotspot, one Primary Response Teams is to be constituted by selecting villagers/ volunteers. The main function of each team would be watch and ward duties to spot elephants which are entering the habitations. On spotting such events they must inform the Rapid Response Teams and local officials. Till the time Rapid Response Teams is able to reach the conflict spot, these teams should do the preliminary work such as informing the other community members, mobilize people for helping Rapid Response Teams operations etc.. The team members of such Primary Response Teams must be provided basic tools such as torches, flash lights, fire torches, crackers etc..

The guarding method of protection of crops was found to be largely successful in reducing a mitigating Human Elephant Conflict in many parts of the world and need to be received. Community through Primary Response Teams must be involved in watch and ward of the crop fields. Watch towers/ Machans at critical locations must be constructed to observe the movement of elephants and guard against any intrusion in the crop fields. The community must be sensitized and capacity building must be done to tackle simple situation on their own.

8. Equipping Veterinary Care

At present the department is having 14 veterinary doctors. They are posted to protected areas and in various divisions. In severe conflict situations, their help may become essential. Each veterinary centre must be equipped with sufficient and proper medicines/ equipments. Trainings should be imparted to all veterinarians in managing wildlife conflict situations especially when rescue and rehabilitation of animals is involved.

9. Developing Kumki Squads - Deploying Kumki elephants to mitigate human elephant conflict

Kumki elephants are trained elephants to handle and manage wild elephants in conflict situations. Many states such as Assam, West Bengal, Tamilnadu and Karnataka are presently using them for the management of Human Elephant Conflict. Odissa is also

developing a Kumki squad. Kumki elephants are crucial for capture of wild elephants and they are also utilized for monitoring, scaring and driving the wild elephants entering habitation. Kumki elephants are dominant males and they can be used for area domination. When they patrol the boundary area the crop raiding males sense the presence of more powerful and dominant males in the area and they keep away from the area. Currently KFD has very limited number of Kumki elephants, basically all of them trained in Muthanga Elephant camp since 2015. Five of the reasonably trained elephants are with the department and two more are being trained. Development of the current Kumki training program and elephant camp in Muthanga has to be strengthened to produce more compatible Kumki elephants. Multiple exposures to wild elephants are required during training session to gain dominance and confidence over wild elephants especially bulls. Muthanga can be developed as the centre for training of Kumki elephants. Four Kumki squads of four elephants each is necessary to cover the Human-Elephant Conflict hotspots such as Wayanad, Palakkad, Munnar and one squad on standby in Malayattoor or Konni. In such a scenario 9 more Kumki elephants are required. The crop raiding male elephants are usually found to become good Kumkis. The problem elephants should be identified from various landscapes in Kerala and their behavior should be monitored for a long time with radio collars. If the elephant is found to be habitual crop raider and is likely to become serious threat to life and property such elephants can be ordered to be captured and should be sent to Muthanga for subsequent training. Such a course of action will reduce the serious conflict in many hotspots and will also enable the department to develop Kumki squads to take care of the conflict issues in the future.

10. Capture of Problem Elephants

After analyzing the conflict situations the crop raiding elephants can be classified in the four following categories:-

- A. Single bull elephants raiding crops:** This is the classic scenario. It's known that males tend to more crop raid than females. Obviously, any foraging strategy that maximizes the intake of energy and nutrients could contribute to better growth, survival, and physical condition. Male elephants can translate better nutrition into larger body size during the post pubertal stage, when they may show a secondary growth spurt, or later in adult life as they continue to gain weight. A larger body size would confer an edge to a male during competition with other males. Young bull elephants raid the crops

occasionally when they have easy access to the crops to its habitat. Most of the time it does not have a habit of raiding the crops regularly, where as adult habituated bulls tend to raid the crops regularly irrespective of the season and agricultural pattern. This can be more of a behavioral attribute. Most of the times single bull conflict can be seen in large landscape with large number of individuals. For example in Wayanad wildlife sanctuary that occupies in the Nilgiri Biosphere Reserve a large contiguous habitat. This is more of individual specific and the animal can be identified during conflict situations. In fact there is handful of such conflict individuals in many landscapes contributing major share of the HEC situations.

- B. Bull groups raiding crops:** This is again seen in large habitat with large number of bulls with a very good male female ratio. Usually they form 2-3 numbers of adult bulls group but on rare occasions large number up to six elephants were observed. The association between the bulls were not coincidental but was intentional. During daytime they tend to live separately in the forests and form group prior to entering in to the crop fields.
- C. Family groups raiding crops:** Compared to bulls, females and the herd tend to avoid human interactions. However situations can arise when the habitat is highly fragmented and degraded. This is clearly seen in Northeast India particularly in West Bengal. Crop damage caused by the herd is much more than the single bull or bull groups primarily because of trampling of the crop rather than consumption. In many cases elephant herds claiming a regenerated old habitat, which had been abandoned long time ago, were also observed thus leading to conflict during the process.
- D. Strayed bull, bull group or herd trapped in thickly human inhabited area:** Sometimes bull or bulls or family herd may get trapped in deep inside human inhabited landscape may be hundreds of kilometers away from the natural habitat by human pressure during crop raiding. These straying incidences are quite dangerous to human life and property.

In few cases of A, C and D the conflict level becomes very high and the habitual crop depredators who become dangerous to life and property need to be captured as last resort. Before capturing however these animals need to be monitored either visually or by radio

collared devices. It must be ensured before capturing that the elephant is not an opportunistic crop raider but has become the habitual crop raider and either the animal is already a risk to human life or likely to become one in future. Such elephants after careful consideration to the above facts need to be captured and should be trained to become part of the Kumki squad. Relocation of such elephants is not successful in most of the cases and more often it leads to more intense problems at the newer area where the elephants are relocated.

11. SMS Based Alert System

This system is being utilized in many locations in Kerala to inform the general public about the elephant movements and crop raiding attempts so as to avoid accidental encounters. Problem elephants are tracked and whenever their location is near the habitation the local people are informed about the same by bulk SMS service. At present this system is being implemented in 5 locations in Kerala. This system need to be extended to more locations and better backward and forward linkages with elephant spotters, Primary Response Team and Rapid Response Team should be established. Once the functioning of Primary Response Team and Rapid Response Team is made more effective and adequate capacity building of the community is done, this system will help in the mitigation of Human Elephant Conflict to great extent.

12. Monitoring of Herds / Animals

For proper management of Human Elephant Conflict, it is imperative to understand the elephants and their behavior. The various herds and solitary animals residing in a particular landscape need to be identified and tagged. Their movement should be plotted on GIS platforms to understand the pattern of crop raiding behavior. This will enable the Forest Department to understand the spatial and temporal dimensions of the conflict problem. Daily wage watchers or community volunteers should be engaged at various points to record the observations. The data from various observations, photographs etc. are to be collected at one point. This may be called as elephant Information Centre. The Centre should have computers and staff who can plot the observations as GIS on daily basis. Such facilities must be created in all the landscapes facing the problem of Human Elephant Conflict.

Palakkad Division has identified all the individual elephants involved in conflict based on their characteristics and is into study of individual elephant behaviour. All staff

and watchers in Division are trained in identifying the conflict individuals with their physical features and as a result of this, human death could be prevented in Palakkad Division after 2018. Also, the crop compensation due to elephant damage has reduced significantly, in the past three years.

Once an elephant is found to be consistent crop raider then it should be fitted with a radio collar and its movements must be carefully recorded. In case of bull groups the leader of the group can be radio collared and then the movement of such animals can be recorded. The locations where Elephant Information Centre can be created are suggested as follows:-

1. Wayanad
2. Aralam
3. Palakkad
4. Malayattoor
5. Munnar Wildlife
6. Punalur

13. Ex-gratia Payments-

The payment system for ex-gratia in the State is quite smooth and transparent. The rates for ex-gratia payments are as follows:-

1. Human Death	10,00,000/-
2. Permanent Disability	2,00,000/-
3. Loss of Cattle/Agriculture/Houses	100% of loss assessed subject to max of 1,00,000/-
4. Injury to Humans (Expenses for treatment)	Maximum of 1,00,000/-

The application process has been made online and the applications are processed timely. Processing of applications for ex gratia payments is a part of Right to Service. Due to paucity of fund payments are delayed for some time. No significant change in existing system is warranted. Sufficient funds should be earmarked so that payment of all the claims can be made timely.

14. Change in Cropping Pattern

One of the effective measures to control Human Elephant Conflict is to change land use pattern in the areas adjoining to forests and elephant habitats by encouraging or nudging farmers to plant crops unpalatable to elephants. This however is difficult task and will require long term and sustained efforts on the part of the department to work closely with the community. Agriculture Department may be consulted and incentives/ subsidies may be given to the farmers to change cropping pattern. Jan Jagrata Samithis, Van Samrakshana Samithies and Eco Development Committees can take the lead in this initiative. Department can provide support to farmers in choosing the crops and ensure the proper marketing so that farmers get adequate compensation and their income is not affected adversely.

Forest Development Agency Ranni has started an initiative to promote the above. Kochathuppara, Velamplavu and Bimmaram VSS were given financial assistance to plant Turmeric, Wild ginger and Kasthuri Turmeric which are the crops unpalatable to elephants.

In Palakkad Division initial sensitisation of Agriculture Officers including Project Director, ATMA and Director, Agriculture, is done and a pilot project is in its preliminary stage of implementation.

Such initiatives in other high conflict zones should be encouraged and initiated.

15. Implementation of crop insurance scheme

Kerala Agricultural and Farmers Welfare Department is implementing the crop insurance scheme for the damage caused to agricultural crop due to natural calamities. Under this scheme, wildlife depredation is also considered as a natural calamity and 27 important crops including annual and perennial crops are covered under this scheme. Kerala Forest Department is also having the scheme of distribution of compensation for the crop damage due to wildlife depredation. In this regard, steps have been already taken to explore the possibility of operating this scheme jointly by both the Departments. In the initial stage, the scheme will be implemented on pilot basis in two Divisions. Directions are given to Divisional Forest Officer, Palakkad and Wildlife Warden, Wayanad Wildlife Sanctuary to submit a detailed report on modality including the cost effectiveness in executing such a scheme in the selected ranges.

16. Community Involvement in Human elephant Conflict Mitigation

The communities living near on inside forests have faced the conflict problem since long and they have also evolved the local level strategies to deal with it. However, since last one on two decades the community involvement in mitigation efforts has waned considerably and the whole onus of dealing with the conflict is put on the Forest Department. We recommend that the community should be involved in taking responsibility for crop protection using low cost deterrent methods. Night guarding of the croplands must be revived so that when elephants try to enter the habitation, they are chased back by using any of the repellent methods. Some of the tribal communities in state are not afraid of elephants and they have developed capabilities of driving away crop raiding elephants. In many parts of state, the communities have developed local methods such as saree fencing, use of fire or lights, use of sounds, use of dried fish on border to keep away monkeys, fences with bamboos to deter wild boar etc. such practices need to be documented.

Kerala has made a good beginning in this regard by formation of Jan Jagrata Samithi. This is a good platform to bring the Forest Department and local community leaders on same platform to discuss human wildlife conflict and to find solution to the problems. VSS/EDCs should be empowered by Jan Jagrata Samithi to take up mitigation measures and the department must support such initiatives by capacity building and to provide necessary resources for human wildlife conflict mitigation by local communities. The manpower with the Forest Department is very limited therefore the support of the communities will act as much needed force multiplier in pre-conflict and conflict mitigation measures. The following activities may be undertaken at the earliest to strengthen the community involvement in Human Elephant Conflict.

1. Jan Jagrata Samithi should be revived and frequent meetings should be called to review and discuss the Human Elephant Conflict situation in their area.
2. VSS/EDCs must form the bulwark of the Human Elephant Conflict mitigation plans. These must be involved in planning and execution of Human Elephant Conflict mitigation plans.
3. Capacity building of the community to effectively deal with Human Elephant Conflict

issues must be carried out at the earliest.

4. Resources in form of funds and technical support must be provided by the Department or by Panchayaths.
5. Long term mitigation measures such as change of land use or cropping pattern should be encouraged.

17. Early Warning System (Wild Watch)

Wild Watch is an integrated human wildlife conflict mitigation system that consists of multiple modules that work in tandem with each other to provide a streamlined and stable operating environment. It performs some fundamental operations and duties in conflict mitigation like:

- Dealing with human-wildlife conflict in an adaptable and peaceful manner.
- Helping authorities to get precise locations of conflicts.
- Helping rescue teams to take well-thought decisions.

The various modules of the system that support its working are:

1. Early-Warning System
2. Staff-Assistance System
3. Reporting and Analysis System
4. Fence Monitoring System

These modules have been integrated seamlessly with each other to complement their strengths and be highly efficient and effective as a human-wildlife conflict mitigation system. The Early Warning System is the first and most important component/module in the system. This system uses information from people who inform about the presence of wildlife using the Mobile App platform. These inbound alerts will be collected on a server and based on pre-defined criteria, an alert will be sent to the general public as well as response teams. The important parts that constitute this module are the android app and the administrator's web interface.

The Staff-Assistance module can be used to track and guide officials and staffs to the conflict zone. This system facilitates communication between the control centre and officials via the app.

The Reporting and Analysis module can be used to archive and view reports of wildlife conflict using Mobile App platform. It can be used to make predictive models and take learned decisions. Reporting will also have facility for adding photos, as proof, this will generate a document for research and other purposes.

The Fence Monitoring System monitors the integrity of the fences and detects breakages as well as anomalies in the fence network. The status of the fence can be monitored by the admin at any time. The admin may then take necessary action. The system consists of a hardware detection device that is integrated with the web interface of the administrator. The device is custom built, waterproof and found to be effective during its testing. A control station has to be established for smooth coordination of activities. Wild Watch was successfully implemented during Sabarimala Pilgrimage and the same software with slight customization can be used here.

Major factor of long-term mitigation measures is data collection from the entire landscape. Modern tools can be used for more effective and scientific data collection. Data collected using the early warning system (Wild Watch). Using this system, after mitigating each conflict, data like animal involved, date and time of conflict, cropping pattern or land use of the conflict area, GPS location of the conflict area, activity of the animal at the conflict area etc., can be collected. Data acquired over a period can be used for trend analysis, developing conflict prediction models and many more uses.

18. Usage of Unmanned aerial vehicles (Drones) in Man-animal Conflict Mitigation:

Unmanned aerial vehicles (Drones) comes are useful in managing man-animal conflict in many ways

- (1) **Locate and Monitor wild animals that are coming to human inhabited areas:** The day and night camera system(s) on the drone can be used to locate and monitor wild animals' activities during both day and night scenarios. Since the system is attached to a drone, it can be relocated easily and can be used to follow the animal to know where it is heading.
- (2) **Safely driving away wild animals back to forest with minimal collateral damage:** The Flashlight -speaker (Animal Control) payload can be used to produce flashing light

and pre-recorded sound the animal might be afraid of. This might help to scare the animal and drive it back to its own habitat. For example: Elephants are scared of flashing light and roaring sound of tiger.

- (3) **Alerting the public on the presence of wild animals nearby:** During an event of a wild animal activity (eg: tiger) in human inhabited areas, the public announcement payload can be attached to the drone and can be used to give important live announcement to public with maximum effectiveness. Since the communication is direct from forest officials, authenticity and rate of penetration of such messages shall be high. On top of that, this method of broadcasting might help the officials to communicate live updates much faster. It may help the public to act on the instructions without much confusion.
- (4) **Day and Night time search and rescue assistance:** During daytime, the day camera can be used for search and rescue assistance. During night time, the rescue operations can be slightly tricky due to lack of light and lack of environmental awareness. In this scenario, the night camera will be useful. Along with that, the high intensity aerial lighting payload can be used to light up the area for the ground rescue team.
- (5) **Routine inspection of hard to reach forest area:** The day and night camera can be used to execute routine inspection of the interior and not easily accessible forest areas to monitor wildlife activities, to check unauthorized human activities in reserved forest areas.
- (6) **Forest fire fighting assistance:** The fire extinguisher payload consists of exploding powder-based fire extinguisher that will explode when it comes in contact with fire. These extinguishers can be dropped from the drone to the region of fire from a height. Forest fire drives away animals from forest area to adjacent human habitations, so early fire detection and control of fire is essential for wildlife management.

Drones are more suitable to Kerala conditions because most of man-animal conflict particularly elephant issue is present in tough terrain and it is difficult for knowing exact location and it is not easy for the anti-depredation team to reach each location, drones may come to handy in such situations. This initiative has not been taken in the state to any significant level and the state must take early action to procure drones for fire protection and for mitigation of human elephant conflict.

19. Trip Alarm for Elephant

Trip alarm is a warning system to prevent elephants from damaging the crop fields or human settlements. A thin wire is installed around a field or a settlement at the usual entrance of elephants; whenever the wired circuit is broken, it makes a loud sound. The noise alerts people and irritates elephants tending them to go back without entering the human territory. The installation of this cost-effective early warning system is easy, requiring regular maintenance without frequent replacements. It is more suitable to small fields which are fringe of forest and tribal colonies located inside forest area. This may be installed on pilot basis on one or two locations and after studying the effectiveness and feasibility the activity can be upscaled.

20. Sensor based Alarm System

Sensor based Alarm system can be tried to detect the presence of elephants in or near village or agriculture land. These are Solar powered Infrared based systems and could be even fitted with a camera and can alert villagers/ RRT when elephants are close to human settlement or agriculture land through SMS/Light/Alarm. The Primary response team and Rapid response team could then come into action to drive the elephants back to the forest area. This may be installed on pilot basis on one or two locations and after studying the effectiveness and feasibility the activity can be up scaled.

21. Mitigation Measures for Conflict with Species other than Elephants

The department has already preparing protocols for dealing with animals other than elephants. The draft protocols are ready. These need to be presented before Wildlife experts, officers and finalized after discussion. These protocols should be finalized within next six months.

Part -II

Animal poaching for their trophies and body parts is another major challenge for conservation of wildlife. There is a high market value for most of the wild animal trophies, so poachers are ready to take huge risk for collecting them. It is also observed over a period of time that these poachers' groups are highly connected and influential. They are also deploying advance methods and using sophisticated weapons to kill the animal. In order to deal with such challenge wholistic approach is required. During the last few years, the department has considerably strengthened the protection in the forest areas by construction of interior area patrolling camps and by regular patrolling and combing of interior forest areas of the state. All the animal deaths are investigated and the wildlife offences are booked timely and the investigation and prosecution of such offences are regularly monitored by senior officers. The following suggestions are however offered to further enhance and improve the protection efforts of the Forest Department.

1. **Continuous patrolling and perambulation by the staff with advanced tools and weapons:**
 - a. Periodic boundary patrolling by staff in forest fringe area creates sense of fear among offenders. It also helpful in finding snares, small bombs etc. along the boundary. It is an opportunity for staff to sensitize people along the boundary regarding conservation of wildlife and also acquaint them of legal consequences they have to face in case of violation of Wildlife (Protection) Act 1972 and the rules. After the incidences of the elephant killings in Mannarkad and Punalur divisions, Chief Wildlife Warden had ordered the perambulation and patrolling of all the forest boundaries. This was carried out and many illegal activities were detected. The perambulation of boundary should be carried out regularly and needs to monitored at Division, Circle and State level.
 - b. Habitual offenders and poaching gangs go deep inside forest, camp for some time to hunt wild animals for their trophies. Continuous perambulation of forest areas by staff is must to find such culprits and nab them before committing crime. M-TRIPES, android mobile application developed by Wildlife Institute of India is really helpful in planning perambulation activities inside forest area. It gives geographical information regarding traditional poaching areas, areas which are not covered by

staff etc. All forest divisions can deploy such IT tools for managing their perambulation activities.

2. Intelligence gathering and sharing of information with all levels of enforcement units for prevention and timely catching of culprits:

- a. Intelligence collection is one of the crucial areas to be focused. With advance of modern technology particularly Information Technology and Information enabled services, poaching gangs are able to manipulate activities by staying away from far off places. Lack of well streamlined communication between different forest divisions in state as well as across the state being utilized by these gangs to carry forward their activities without problems. Intelligence network is required to share information across the forest divisions and also with other states. Intelligence interface also required with other enforcement units like police, exercise etc for getting more information.
- b. Another dimension to intelligence gathering is to have well connected informers from local area. Presently informers are very few and it is happening in an ad-hoc basis. They are not much encouraged to come forward because of very low financial incentives provided to them. All the Divisions and Range offices should be given enough financial allotment to build a good network of local informers, like it is available in police department.

3. In-time investigation and prosecution of cases:

- a. In-time investigation and prosecution of cases, related to wildlife poaching, not only punishes accused but it also creates a sense of fear among other poachers. It discourages poachers in taking up such illegal activities. But it is not a simple task. It is required to enhance the capabilities of field staff in investigation procedures through continuous and effective training modules, and also giving them access to advanced investigation tools. For example, access to call data registry of accused helps a lot in gathering more evidences and timely completion of prosecution. But it is very difficult for forest staff to get such data. Once data is received, meaningful pattern can be identified with some software applications. Very few staff have knowledge on using such modern software applications. So, we need to develop in-house capabilities to get these CDR timely. It is recommended that forest officers should also be empowered to call for such records from the mobile operators directly

for the investigations of Forest and Wildlife related crime. At present the forest officers are dependent on Police for obtaining such details which lead to time lag in obtaining such records.

- b. Maintenance of list of habitual offenders and their details are always helpful in investigation and prosecution. This database is useful in screening of offenders. Their residential and other details also very much helpful in collecting the evidences. Kerala Forest Department has started an online Module called "HAWK", which maintains the list of habitual offenders entered and vetted by field staff. It contains all details regarding an offender like residential address, phone number, and involvement in earlier cases etc. This database is accessible to all field staff across the divisions. Similar database may be created at national level to have a free flow of information across the states regarding wildlife offences.

4. Preventing Electrocution of Elephants

To prevent the death of the elephants and other animals by electrocution directions have been issued to all the field officers by the Chief wildlife warden to coordinate with the officials of the KSEB and ensure implementation of the following things

- a. Installation of conductor of an overhead line as specified in Indian Electricity Rules, 1956 for low and medium voltage line(5.8 meters) and for high voltage lines (6.1 meters)
- b. Rectification of sagging transmission lines and cable of existing transmission lines in the Protected Areas
- c. Joint inspection of every transmission/distribution line passing through the protected areas
- d. Use of Aerial Bunched Cable (ABC) or underground cable
- e. Erection of electric poles with spikes to prevent elephants rubbing against them.
- f. Removal and dismantling of defunct solar powered fences

The action on all of the above points must be completed in a time bound manner.

5. Preventing deaths of elephants due to train accidents

The places vulnerable for accidental death of elephants by the trains are as follows:

- a. Kanjikkode Walayar section "A" LINE 6.5 km through forest and "B" LINE 11.5 km through forests.

- b. Walayar-Podanur section "A" LINE – 2 Km through forests and "B" LINE – 5 km through forests.

The urgent mitigation measures being adopted to reduce the mortality are as below.

- I. Deployed 11 numbers of NMR watchers for day and night patrolling along the Railway Track.
- II. 18 kms of solar fencing is constructed and maintained periodically along the railway tracks.
- III. Solar lights have been erected nearby railway tracks.
- IV. Continuous communication is maintained with Railway authorities and watchers.
- V. Joint patrolling is done with the railway trackman during the night hours.
- VI. Direction is given to loco pilots to continuously horn when the train is passing through forest area, especially when the presence of elephant is detected and communicated.
- VII. Train speed restriction @ 45 km per hour when passing through forest area during night.
- VIII. Railways have constructed ramps along the tracks passing through forest to facilitate easy movement of elephants away from the track on the site of a train for 6 km length of line B.
- IX. Vista clearance is done in the bushy areas on both sides of railway tracks passing through forests to reduce the tendency of elephants camping in such locations and also to increase the visibility to the watchers, trackmen and locos.
- X. Common whatsapp group is formed with Railway officials up to the level of Sr DEN and DFO and all watchers to make easy communication during elephant sighting so that immediate caution is exercised by control.
- XI. Continuous monitoring of the elephants wandering near to railway tracks are done as a measure of caution.
- XII. Established watch towers on Line B, which are manned 24 x 7 at place of mobile connectivity and they pass on information to Station Master for alerting LPS.

XIII. Constant training and awareness to loco pilots on warnings and precautions.

XIV. Best possible solution is to find alternative to LINE outside forest area.

It is recommended that the above activities are monitored and continued to save the elephants from the train accidents.

Submitted before Hon'ble National Green Tribunal, Southern Zone Chennai



Deepak Mishra
Chief Conservator of Forests
Central Circle, Thrissur
(On behalf of Joint Committee)

An- 6

नोयल थॉमस
NOYAL THOMAS



सत्यमेव जयते

वन महानिरीक्षक
भारत सरकार
पर्यावरण, वन एवं जलवायु परिवर्तन मंत्रालय
INSPECTOR GENERAL OF FORESTS
GOVERNMENT OF INDIA
MINISTRY OF ENVIRONMENT, FOREST AND
CLIMATE CHANGE

D. No. 13-1/2015-PE

Dated 10th June, 2020

Dear Sirs,

I am writing this letter to invite to your kind attention to my earlier D.O. letter dated 26th December, 2019 regarding the death of elephants and humans due to increased human-elephant conflicts in the country. However, it is seen that this Ministry has not received the real time information on death of human beings and elephants even after repeated requests. It is rather undesirable to get information from the various print and media. The recent incidents of killing of elephants using explosives and poisoning have further highlighted the seriousness of the HEC issues. It is also requested that necessary preventive measures including strict vigilance are taken to prevent such unfortunate incidents in future.

Hence CWLW's are once again requested to provide the real time information on death of elephants and human beings on the same day, as and when such incidents are reported from the field.

Thanking you,

Yours sincerely,

(Noyal Thomas)

To

The Principal Chief Conservator of Forest (PCCF) & Chief Wildlife Warden (CWW), All Elephant Range States.



पृथ्वी विंग, छठा तल, इंदिरा पर्यावरण भवन, जोर बाग रोड, नई दिल्ली-110 003, फोन : (011) 24695249, फैक्स : (011) 24695364

Prithvi Wing, 6th Floor, Indira Paryavaran Bhawan, Jor Bagh Road, New Delhi-110 003, Tel. : 011-24695249, Fax : 011-24695364
E-mail : igf.fp-mef@gov.in, igpe-mef@nic.in

Guidelines for Management of Human Elephant Conflicts

INTRODUCTION

1. Definitions

Human elephant conflict: The Elephant Task Force (ETF) defines human-elephant conflict (HEC) as the adverse impact people and elephants have on each other

Hard boundary: The Elephant Task Force (ETF) defines hard boundary as distinct boundaries between human use areas and elephant habitat areas

Diffused boundary: The ETF defines diffused boundary as where the boundary between human use and elephant habitat areas is not clear, especially under conditions of complex land use mosaics

Deterrent measure: These are measures used to prevent entry of elephant in human use areas such as villages, agricultural fields and urban areas etc.

Repellent measure: These are techniques used to drive away elephants when they have already entered human use area

Obligate crop raiding: The ETF defines obligate crop raiding as situation where elephants are forced to raid crops due to insufficient forage resources in their natural habitat.

Opportunistic crop raiding: The ETF defines opportunistic crop raiding as situation where elephants raid crops due to their availability and attractiveness rather than shortage of natural forage resources in forests.

Kunki: Captive trained elephants used for elephant drive and capture operations

Seasonal migration of elephants: Elephants are migratory species and generally follow the same migratory routes annually depending on ecological conditions. Asian elephants in deciduous forests of southern India, with numerous water sources, reported elephant migration to extend between 20 and 50 km.

2. Background

Human elephant conflict (HEC) has emerged as one of the most challenging problems for elephant management and conservation in recent times. It creates considerable economic hardships for the affected farmers. There are several regions that experience crop damage by elephant year after year. Human deaths due to encounters with elephants are also an issue of serious concern. It is estimated that every year approximately 400 persons are killed by elephants across the country and more than 100 elephants are also killed annually, mostly as retaliatory killings by people.

HEC has proved to be quite intractable and managing HEC is a big problem for forest officers and frontline staff, who have to deal with it, often on a regular basis. Often they have to face the ire of the affected farmers, especially when there is a human death or severe injury. There are innumerable incidents when frontline staffs have faced the ire of affected people due to HEC, sometimes at risk to their personal safety.

Considering these factors management of HEC is one of the most important issues that need to be addressed in planned way for conservation of elephants.

The main types of HEC are:

- i. Human injury or deaths in encounters with elephants
- ii. Damage to standing agricultural and plantation crops
- iii. Damage to harvested and stored agricultural crops, often accompanied by damage to the storage facility
- iv. Damage to property such as sheds, houses, pipelines and irrigation facilities.
- v. Death/ injury to cattle and other domestic animals.
- vi. Injury and death of elephants mostly due to retaliatory attacks by humans due to electrocution by power lines or poisoning
- vii. Death of elephants due to train collisions
- viii. The development activities and houses in movement path of elephants (especially labour lines in tea gardens) are also causes of encounter between human and elephants leading to HEC

The single most important reason, elephants enter human use areas are to feed on agricultural and plantation crops. The second reason is for water, with damage to property and human life arising as incidental damage, from trampling or some feeding on crops by the elephants.

The ETF defines describes obligate and opportunistic crop raiding. In many circumstances it is difficult to identify the type of crop raiding. Therefore in these guidelines the approach is taken of symptomatic treatment of HEC rather than trying to identify the cause of crop raiding. The issue of habitat improvement to meet the elephants forage and spatial needs within forest areas has been addressed in detail in the ETF report.

Retaliatory or accidental killing of elephants is the other face of HEC. The affected community or individuals sometimes retaliate against elephants, either in revenge, or to prevent further attacks by elephants. Practices adopted for retaliatory killings include shooting the elephant or electrocution (sometimes by accident as these are often meant to deter other wildlife such as wild pig). Therefore elephants are also the victims of HEC.

Complete solutions to HEC probably do not exist. However, good HEC management and mitigation practices can go a long way to minimize the adverse impacts of HEC on societies.

3. Factors Influencing Intensity of HEC

HEC intensity is highly variable, ranging from very occasional to chronic. Density of elephant populations obviously plays an important role in HEC intensity. The nature of the interface between human areas and elephant habitat also determines conflict intensity, where an irregular and diffuse boundary with a long perimeter is thought to increase intensity of conflict. Highly fragmented elephant habitat interspersed with human use areas is also likely to increase conflict frequency and intensity. In some cases dispersing herds wander into extensive agricultural habitats with hardly any forest and cause high intensity of conflict, at least in the initial years. In some regions the agricultural damage is lower and the conflict is mainly due to loss of human life. Train-elephant collisions occur frequently in Bengal, Assam, Odisha, Kerala and Tamilnadu, where railway tracks pass through forests with sizeable elephant populations. The HEC management strategy also needs to be adjusted to suit the particular situation and both short and long term measures should be adopted based on the field situation to mitigate HEC.

4. Organization of these guidelines

These guidelines are written in three parts - an introduction, an overview of current HEC management practices, and prescribed guidelines to minimize and mitigate conflict.

OVERVIEW OF CURRENT HEC MANAGEMENT PRACTICES

5. Installation of Barriers

Barriers are used for preventing elephant exit outside reserve forest areas or entry into cultivated fields or human inhabited areas. Barriers may be used to guide elephants through funneling to over-bridges or under-passes set up for them to negotiate railway lines, highways or canals safely. The principal types of barriers used against elephants:

- Elephant proof trenches (EPT)
- Solar-powered high voltage electric fences
- Rubble walls
- Other types of fences made from railway tracks, steel channels and bars etc.

There are different strategies to install barriers.

- i. Construction of barriers **around forest areas** to keep elephant inside the forest.
- ii. Sometimes barriers are constructed **across the landscape**, between two states, two districts and even between two countries.
- iii. Barriers can be constructed **around the settlement** to be protected such as a village or an enclave

Given below is a review of effectiveness of barriers for managing HEC.

Barriers achieve only partial success at best. Elephants often find their way around barriers, over or through barriers and gain entry into the desired area.

Though it is commonly used, Strategy (i) is not useful or advisable around small forest blocks because such forests cannot provide all the space and food requirements of elephant clans or even bulls. It may be moderately useful around large forest blocks that are capable of providing the resource requirements of elephant clans. They may be effective in protecting adjacent inhabitations. However it is nearly impossible to completely encircle forest blocks. Hence, barriers at the edge of forest blocks can at best be installed as a local protection measure. Barriers are more likely to be effective in case of hard boundaries where there is a clear boundary between elephant habitat and human use landscape.

If inappropriately placed, barriers have the disadvantage that they can block or alter traditional migration routes of elephants and prevent genetic interchange between populations. They may therefore, at times, be contrary to the scientific principles of wildlife management. Therefore, large scale barriers need careful study before implementation. They need to be planned at a landscape level taking into account the presence and seasonal movement patterns of elephant clans.

Strategy (ii) is practically useless because it is impossible to create effective barriers at landscape level. It is also futile to put up barriers between States/ Countries (or other political/administrative boundaries) because elephants need to move across ecological landscapes and not be confined to administrative units.

Strategy (iii) is most effective for protection of crops from elephants, but it can be used only in specific situations wherever there is a compact area that needs to be protected. Barriers are moderately effective if used to protect small enclaves. They are not so effective if used around large enclaves. In a largely agricultural landscape it becomes difficult to create effective barriers.

Involvement of the local community or the stakeholder is most important for effectiveness of barriers. The stakeholders must be actively involved in installation and the maintenance of the barrier. The process needs to be inclusive, and *Gram-*

sabha may be consulted in such discussions. Otherwise the barriers, exposed as they are to the elements, soon deteriorate and become ineffective. This is true for all types of barriers. In many states stakeholder involvement has proved ineffective because of poor interaction between the community and Forest Department.

Of the various barrier types, elephant proof trenches (EPT) require high investment and are difficult to maintain. They are prone to soil erosion, especially along slopes in high rainfall regions. The recommended design of EPTs consists of segments separated by walls – known as septa – to prevent water flow. This precaution is sometimes overlooked causing severe soil erosion. EPTs should be strongly discouraged in regions with rainfall higher than about 1500-2000 mm per annum.

Solar electric fences require lower investment than EPTs. However maintenance of solar fences by the community is generally poor. Solar fences work best when installed by institutions and individuals. Elephants are known to cross solar fences by breaking those using tusks or branches of trees.

Nowadays strong barriers are being created using steel channels, railway tracks and concrete walls. Such barriers may be successful in stopping elephants but they need high investment. They may be useful over small distances at critical locations. At a larger scale it is difficult to justify the cost.

Spikes are also being installed on the barriers as an additional deterrent measure. In one design a concrete strip is erected at ground level all around the area to be protected and metal spikes are inserted in the barrier. If an elephant steps on it, its feet pads will be seriously injured. In another design spikes are created on concrete walls or strong concrete walls. Such spikes are dangerous and may seriously injure elephants, wild animals, livestock and humans.

6. Anti Depredation Squads (ADS)

Anti-depredation squads are commonly used in North Bengal, Assam, Odisha and Chhattisgarh where large groups of elephants raid agricultural crops. ADS are equipped with a vehicle, torch, siren, fire crackers and sometimes even double barrel guns, especially in Sukhna - Mahananda region of North Bengal. The presence of ADS gives the community a sense of reassurance that the government is protecting them and their property. ADS is effective if it is managed by technically competent persons, trained mahouts and kunki elephants. It requires high level of coordination between divisions. However, the manner in which it is often implemented operations of ADS is not systematic and there is a lack of standard operating procedures. There is lot of chaos in activities of ADS, with participation of local mobs which reduces their effectiveness. Shots are sometimes fired in the

ground near the elephants to keep them moving towards the forests. Elephants, including calves, are also poked with iron spears to drive them.

7. Elephant Drives

Elephant drives are often carried out by the Forest Department. Often the aim is to drive the elephant herd out of their range so that it becomes someone else's problem. Another objective is to drive it towards the forest. Sometimes cruel scaring tactics are used to drive the elephants. In one recent case a young calf got permanently separated from the mother, and later died of stress and starvation.

In some states elephant drives are the mainstay of conflict mitigation. Herds of over 100 elephants are regularly driven towards the forests. The elephants take shelter in the forests and return to feed on crops when people go away. This to and fro movement causes stress for the elephants. They become agitated when surrounded by people. In such cases they often charge at people and the conflict aggravates.

8. Kunki Elephants

Kunki elephants are used in Assam, West Bengal, Karnataka and Tamil Nadu. Odisha FD is also building up a kunki squad. They are found to be fairly effective in driving away elephants from villages, for monitoring/capturing/ tranquilising/ translocating/ training/ hunting of problem elephants. Kunkis are generally used in unmanageable situations as a last resort. However there is high cost involved of hiring kunkis and feeding them. Sometimes, kunki elephants may not be able to reach the conflict site quickly. Moreover there are few, well-trained kunki elephants available nowadays. However, training should be imparted to elephants and mahouts to develop their skills for use during HEC situations.

9. Commonly used repellent methods

A variety of local repellent methods are used by farmers.

Loud noises and crackers

This is the most common technique used because it is simple and can be used by everyone. Typically these consist of drum beating, shouting, and bursting crackers. These measures are sometimes effective and at other times ineffective, depending on the habituation of the elephants. Male elephants are generally more resistant to such measures. Sometimes presence of a large crowd is most effective in driving away elephants. However, in certain case e.g. in urban settings and congested places crowd management becomes biggest challenge and may lead to injury to people.

Other repellent methods

Other repellent methods such as electric torch, kerosene torch (mashāl) and swinging fireball are used. These are all moderately effective if done systematically.

10. New repellent methods

Bee sound

Elephants are known to be afraid of bees. Bee sound played has been used as a repellent method in Africa and found to be very effective, especially if it is backed by beehive fences.

Carnivore sounds

Playback calls of predators such the tiger or even smaller carnivores such as leopards may evoke negative responses in elephants and keep them from entering agricultural areas.

Drones

Drones have been recently used in Africa to drive away elephants over long distances, and found to be very effective. Elephants are scared of drones and quickly run away from the site when buzzed by a drone.

Drones use the same principal as the bee fences where the sound of the drone is perceived as swarm of bees and elephants beat a hasty retreat. It is a good option to implement if the resources for drones are available. However drones are difficult to fly at night due to limited visibility. Permission from various authorities is also required to use drones, particularly near international borders. Also drones may be less useful in heavily populated areas because of the risk of trampling of crops and people by elephants.

11. Deterrent Methods

Trip alarm

Trip alarm consists of a string stretched across entry points of elephants and connected to a switch of a battery-operated electric bell. The alarm bell rings when elephants cross the trip. This gives sufficient warning to the community to come to the point and drive away elephants. Trip alarms are very effective in situations when entry points of elephants are known.

Sensor based alarm system

Sensor based alarm system could be tried to detect animals in or near village/agriculture land or even to detect elephant near railway tracks. These are solar powered infra rayed system and could be even fitted with camera and can alert villagers/ driving squad when elephants are detected close to human settlement or agriculture land through SMS/lights/sound, etc. The PRT and RRT could then come in action to drive the elephant. This will help from physically guarding the agriculture field by villagers.

Night Guarding

Night guarding is a traditional way of protecting crops against wild animals but it is falling into disuse because of disintegration of the traditional joint family system in rural India and increasing labour costs. Use of old and physically challenged persons for night guarding is known to be a major cause of human mortalities and injuries by elephants

Therefore, community guarding is one of the most effective ways of protecting crops. Farmers should sleep on watch towers created in their fields or on machans (platforms constructed on trees). This should be a community activity. It needs to be done only when elephants are known to be active in the area for crop raiding. It is more effective when combined with trip alarms.

Chilli-based methods

Chilli is known to have an irritating effect on olfactory nerves of elephants. Hence chilli-based methods are found to be effective against elephants. It may also act as a psychological barrier. Chilli as a repellent can be used in the form of chilli smoke, chilli rope, chilli curtain and chilli bricks. Chilli ropes were found to be more effective against elephant family groups than bulls, and in drier regions as compared to high rainfall regions (Chelliah et al. 2010, Current Science); thus it is more appropriate to use this deterrent for only a few weeks prior to harvest of cereal crops to minimize the chances of elephants being conditioned to recognize this as harmless.

Chilli smoke is one of the effective methods as elephants are known to sneeze and cough while inhaling the smoke. Elephants change their paths if they come across chilli smoke. Chilli smoke can be generated in many ways, limited only by human ingenuity. It can be generated by incorporating chilli in slow burning grass bundles or dung cake, sprinkling on slow burning embers and camp fires.

Beehive fences

Elephants are known to be afraid of bees. In Africa bee hive fences have been found to be effective in deterring elephants. A series of bee hives is created at short intervals along fences at the boundary of the enclave. The bee hives are connected to the fence. The bee hive model commonly used is the top bar model. When elephants try to enter the bees get disturbed and start buzzing around the elephant thus driving away the elephants. It is also said that if elephants encounter bees, they will alert other members of their herd through low frequency sounds (inaudible to humans). Farmers get additional benefit of income from honey and better pollination.

VHF pairing and setting up direct hotline: For avoiding rail collisions, VHF pairing with railway authorities, round the clock deployment of forest staff in control rooms of DRMs of Railways and erection watch tower and temporary sheds has to be done in strategic locations. Measures should be taken to set up direct hotlines to contact with railway authorities, where passage of elephants across railway tracks is regular.

Alternate cropping:

Alternate cropping with non-edible crops like chilli, citrus not consumed by elephants could be grown in forest fringes as well as areas near settlements in forest fringes may deter elephants from reaching and raiding the crop fields. Some forms of vegetative barriers may be effective.

Other methods

Elephants are known to be afraid of any unfamiliar sight, sound or smell. Therefore various inventive methods can be used that create unfamiliar visual, aural and olfactory effects can be effective in repelling and deterring elephants. The key is to keep altering the methods to prevent familiarization by the elephant.

12. Community Based Conflict Management (CBCM)

The main concept is that the community should take responsibility for crop protection with emphasis on low cost deterrent methods such as trip alarms and chilli based methods such as chilli-smoke and chilli-rope. There is strong emphasis on night guarding. In case elephants enter they are driven away by some of the repellent methods described above. In Africa studies have shown that there is an 80% reduction in crop damage where crops are protected by the community. The strategy has been found to be effective where it is implemented in Africa and India. Sometimes individual farmers proactively protect their crops but CBCM works best at the community level when all farmers come together to protect their crops. The challenge is to get communities to implement it because it needs additional work from their side and they prefer to let the Forest Department handle it. Some traditional communities are not afraid of elephants and drive away elephants effectively. When they encounter such communities, elephants prefer to change their path and go to other areas.

A large extent of elephant habitat in the north-eastern India is managed directly by the communities and CBCM in such areas is not a matter of choice but an imperative. Capacity building of the autonomous councils and Local Bodies in these areas should be carried out in the same way as that of the SFDs.

There is a lot of scope for involving communities in planning, constructing and maintaining barriers; recruiting night guards and labour for ADS / Rapid Response Teams; and verification of claims for *ex-gratia* relief. Insurance cover should be provided to the community members involved in HEC management. Selected community leaders can be recognized as Honorary Wildlife Wardens and some limited powers under Section 11 of the WPA-1972 (e.g. capturing of macaques, hunting of wild boars and blue bulls) can be delegated to them.

Logic of CBCM

The Forest Department has limited number of staff that can participate in HEC management. If an elephant enters a village the manpower available in the village is far more than the Forest Department can provide. By empowering the community and capacity building it is possible to have a much stronger manpower force for protection of crops from elephants. In many states shortage of staff is a major hurdle in HEC management and for working in cooperation with the community.

Due to natural inertia, acceptance of CBCM by the community is slow. Acceptance and implementation of CBCM is better when it is supported by the Forest Department. CBCM should be implemented through JFM committees because this is the accepted institutional mechanism for cooperation between the community and the Forest Department. An active and vigorous JFM movement is a prerequisite for effective cooperation between the community and Forest Department for CBCM.

13. Ex-gratia payment

In recent years *ex-gratia* for damage to crops compensation has become an important mechanism to redress grievance and assuage feelings of community affected by human elephant conflict.

Ex-gratia is paid in case of crop damage and, in some states, property damage. The damage is reviewed by an authorized officer from the Forest Department or a committee consisting of representatives of Revenue, Agriculture and Animal Husbandry Departments and Gram Panchayat members. A compensation case is prepared and submitted to higher authorities for sanctioning *ex-gratia* according to rates prescribed by State Government GRs or GOs.

In case of injuries to human beings the affected person is provided treatment by the Forest Department free of charge and may be given an additional *ex-gratia*. In case of human deaths the Forest Department provides *ex gratia* payment to next of kin of the deceased at State Government approved rates.

This system of *ex-gratia* has helped to assuage the feelings of the persons affected in the case.

The main criticisms of these schemes, especially by the farmers, have been as follows:

- i. The ex-gratia rates provided in case of crop damage are insufficient
- ii. The ex-gratia process is too lengthy and time consuming so many affected persons prefer not to file complaints
- iii. The ex-gratia is disbursed too late

There is some merit in all these points. Ex-gratia rates are indeed low in many states. In some states, because of shortage of funds, only some farmers are given ex-gratia. On the other hand, studies have shown that farmers often perceive the crop damage to be higher than actual, so their expectations are also higher. In some states the excessively high ex-gratia rate can give rise to fraud claims.

In some states ex-gratia is paid very late while it is very efficient in other states. In Karnataka, in some divisions, the ex-gratia is given within two weeks. Karnataka is in process of incorporating crop damage ex-gratia in its HULI software/ app that will enable much faster resolution of ex-gratia cases.

A novel method of community-assessed ex-gratia for crop damage that is resistant to cheating is worth trying on a pilot scale in some regions (Watve et al. 2016, Global Ecology and Conservation).

The ex-gratia rate for human deaths due to elephants varies from state to state. The rate provided by Government of India is Rs. 2 lakhs. The maximum ex-gratia, in Maharashtra State, is Rs. 8 lakhs. The Gajah (Elephant Task Force) report has recommended that ex-gratia in case of human death should be at least Rs. 5 lakhs.

As ex-gratia support for crop loss by elephants, the farmers could be provided with "*grain for grain*". This is aimed at providing grain as a replacement for the crops lost by the farmers due to elephant depredation as an alternative to the scheme of providing monetary relief as ex-gratia support to the farmers. The scheme also helps to promote food security (money not being used for other purpose) to the affected people with the idea of providing grain to compensate for lost grain aiming to prevent retaliatory attacks.

PROPOSED STRATEGY

The HEC management practices often have a short term objective of crisis management. However for effective management of HEC one needs to have a long term strategy. The guidelines presented herein are presented specifically for managing human elephant conflict. It needs to be dovetailed with other strategies, such as landscape habitat planning, protection of corridors, habitat management,

consolidating elephant habitat, managing elephant population through reproductive control* measures as well as limited capture where essential for a more comprehensive solution.

14. Community Involvement and Empowerment in HEC management

14.1 Advantages of community involvement in managing HEC

The Forest Department frontline staff is often burdened with several responsibilities. They are unable to devote sufficient time and attention to managing HEC. Neither do they have sufficient manpower to counter HEC on their own. Involvement of the community in HEC management is known as community based forest management (CBCM). CBCM is a means of empowering the community to share responsibility of HEC management with the Forest Department. The advantages of CBCM are:

- The community members are already present at the site so they are capable of more rapid response
- They have a vital stake in protecting the crops and property
- The community has far more manpower than does the Forest Department
- They often have detailed knowledge of the village layout compared to Forest Department

In the beginning it may be difficult to involve the community in HEC management. There is commonly reluctance on part of the community to participate in HEC mitigation activities. This stems from the community attitude that HEC management is the Government's responsibility. At the outset this attitude needs to be changed in order to gain participation of the community in HEC mitigation. The community needs to be told that HEC management is a partnership between the community and the Forest Department, and the community stands to benefit considerably from protecting their own crops. Building confidence and capacity of the community is the next step to achieve success in CBCM.

In some states communities are already involved informally in HEC mitigation. However in most states it is the Forest Department that manages HEC. It is suggested that a CBCM program should be implemented through JFM/ EDC committees, wherever they exist, or through the Gram Sabhas, where there are no JFM committees. The Forest Department should play a strong role in hand holding and capacity building. Good relations between the Forest Department and the Community are essential for promoting CBCM.

Other stakeholders should also be involved in HEC management according to the local situation. Some of these are tea estate owners, coffee estate owners and local institutions.

* At present the Hon'ble Supreme Court of India has barred State Forest Departments to take up control of elephant population through immuno-contraception methods under WP (C) 107 of 2013 Shakti Prasad Naik Vs Government of India and others. The Ministry of Environment Forests and Climate Change and West Bengal Forest Department have filed affidavit in the Supreme Court of India to permit elephant population through immuno-contraception methods. The case has not come up for hearing till date.

14.2 Hierarchy of HEC mitigation measures

The commonly accepted hierarchy of mitigating any kind of impact is:

Avoid > Minimize > Restore

Analogous to this strategy, in case of HEC mitigation, the recommended hierarchy of mitigation measures is:

Deterrent measures > Early warning systems > Repellent measures > Compensation

The first priority should be to prevent elephants from entering agricultural fields. To achieve this, deterrent measures should be adopted. If deterrent measures fail, early warning systems will give alarm of elephant presence and enable the community to drive away the elephants. In spite of this if elephants enter agricultural fields, then repellent measures should be used as a last resort to drive away elephants. If the measures are not successful and elephants damage crops, compensation should be paid to the affected farmers.

14.3 Strengthening capacity of communities

Capacity of communities should be strengthened by providing them required support in terms of equipment and material. Within each JFM committee crop guarding squads should be set up for crop guarding and elephant scaring. The crop guarding squads should function as a unit.

The most basic equipment for community guarding of crops is an electric torch. Powerful LED torches are available cheaply nowadays. All communities should be provided such LED torches for anti-depredation work. For this purpose yardsticks should be decided such as one torch for a certain number of households.

Other material may be provided for crop protection such as firecrackers.

14.4 CBCM techniques

Deterrent techniques

Communities should be trained in deterrent techniques for protection of crops from elephants and preventing elephants from entering crop fields. Chilli-based deterrent techniques such as chilli rope and chilli smoke have been found to be very useful in certain situations. Techniques based on sound of humming bees and beehive fences have been found to be useful in Africa and need to be tried in India.

Early warning techniques

Night guarding on watch towers, *machāns*, or any tall structure is one of the most effective early warning and deterrent techniques. Trip alarm has been found to be effective to give early warning of elephant arrival. Night guarding supported by trip alarms is very effective in deterring elephants.

Bulk SMS alerts

In Valparai Plateau in Tamilnadu SMS alerts have been found to be useful in informing people of elephant presence in the area. This system has helped to reduce accidental encounters between elephants and people and has reduced mortalities of people in the area (The SMS alert system is useful in specific locations where there is a problem of regular encounters with elephants). In areas where there is crop damage the farmers require support in preventing elephant entry in their crop field. Also SMS alert requires investment in technology therefore the farmers is dependent on either the Forest Department or an NGO.

SMS alerts have also been used successfully in west Bengal to alert railway authorities about presence of elephants on railway tracks to minimise death of elephants due to train hits.

Repellant techniques

Crackers and drum beating are the most common repellent measures but their effectiveness is low in most situations because elephants have become habituated to them. Some innovative local repellent techniques, such as swinging fireball, have been found to be moderately effective for driving away elephants.

Communities are resistant to adopting new methods. NGOs should be involved in motivating and training the community in different crop protection techniques.

A manual should be created for deterrent techniques and repellent techniques of crop guarding by community. This manual, translated into local language, should be widely distributed in the Forest Department and to other stakeholders.

Community crop guarding techniques are to be situation specific. All techniques may not be applicable to each situation. Techniques should be identified that are useful

for specific situations. Simplified booklets in local language that are useful for the local situation should be distributed to the community.

14.5 Dissemination

Training workshops should be conducted for Forest Department frontline staff in community crop guarding techniques. The frontline staff in turn should train the community in these crop guarding techniques. Literature and training manuals should be made available in community crop guarding techniques to the frontline staff and community.

15. Implementation of Barriers

15.1 General guidelines on barriers

Barriers should not be created across the landscape or along administrative boundaries. Such barriers are useless because they invariably have gaps such as roads, streams and rivers that elephants can use to pass through.

It is found that barriers are most effective when they are used to keep elephants out of small blocks of land such as a small hamlet or an institution. They are less effective when used around large blocks of land, such as large villages.

15.2 Barriers on forest boundary

Barriers should not be created around small forest blocks of a few square kilometers in size because they are not very effective.

Barriers may be created on larger forest boundary if there is severe human elephant conflict. In such cases barriers should be created only if the following conditions are satisfied:

- The boundary is "hard", i.e. there is a clear and sharp demarcation between forest and human landscape.
- The boundary is fairly straight without much convolution.
- The boundary should not be broken by roads, river or large stream because such openings will leave gaps for elephants to move in and out, thereby defeating the purpose of creating the barrier.
- The local community should not have an interest in entering the forest for grazing their cattle or collecting firewood because they will create openings or crossings that will defeat the purpose of creating the barrier. In some cases appropriate gates may be tried.

Barriers on forest boundary, if created, should be used only as a local measure for controlling local HEC. Barriers should never be created around the entire forest

block if this is small, because this will confine the elephant population and compromise their long term genetic viability.

If barriers are to be created a map should be prepared showing location of elephant groups, seasonal migration patterns of elephants and locations of elephant corridors. The map should show location of proposed elephant barriers. A proposal should be prepared with all information and submitted to the Project Elephant Director of the state. Who will take a decision about it after reviewing the entire information and take the advice of elephant experts when needed.

15.3 Types of barriers

Elephant proof trenches should be installed with discretion only where the situation demands. They should not be constructed in sloping or hilly terrain or in regions with high rainfall (1500-2000 mm per annum and above). Technical specifications of EPTs recommend internal walls, known as *septa*, of 10-20 cm width, at intervals of 10 to 20 metres, to divide it into segments so that water does not flow along the EPT and cause soil erosion. These specifications should be adhered to.

Solar (high voltage) electric fences should be installed only under specific situations such as to protect small enclaves, institutions and individual farms. Community involvement is essential for maintenance of solar fences. Written agreement should be made with the community that they will take responsibility for its maintenance. Communities should be given monetary support for maintenance of fences provided they take responsibility of maintenance.

Barriers with sharp spikes that have potential to injure elephants, wildlife, livestock and humans should be strongly discouraged.

16. Anti-depredation squads (ADS)

Anti-depredation squads (ADS) are an essential component of HEC management in some states such as West Bengal and Assam. In these states groups of elephants congregate and enter human use areas in large numbers. In such situations the local community needs the support of the ADS to protect their crops and property.

ADS should be well equipped and the State Government should provide sufficient funds to ensure this. Each ADS should be supported by at least two kunki elephants. However, the use of guns by ADS needs to be strictly controlled. ADS should also not be allowed to use spears and sharp instruments.

ADS should be composed of trained staff with technical knowledge of elephant behaviour and elephant management techniques. ADS should work in a planned manner. At the beginning of every season training sessions should be conducted for

ADS. Trial runs and mock operations should be carried out before the main HEC season. Senior forest officers should take interest in operation of ADS and should participate in some ADS operations. Coordination between territorial and wildlife divisions supervised by a senior forest officer is very important for effective functioning of ADS.

ADS should use humane techniques to drive away elephants. They should not fire at elephants, poke them with sharp instruments or beat them with sticks. ADS staff should be sensitized to humane management of elephants.

When the elephant herd splits into smaller groups it becomes difficult for the ADS to manage the group. ADS should work in partnership with the community so that the community can manage the situation, where ADS cannot reach. This requires empowerment of the community with equipment, material and training. Such operations should be monitored to ensure that the community does not misuse the capacity delegated to it.

17. Compensation (Ex-Gratia Payment)

The rates for crop compensation should be commensurate to the crop damage. It is recommended that compensation for crop damage should be about 60% of the estimated crop damage. If the compensation is close to 100% of the crop value there will be no incentive for the farmer to protect his crops.

Adequate financial provision should be made for compensation for HEC by the states with support from Project Elephant.

The process of spot inspection, preparation of case papers, forwarding to higher authorities and award of compensation and payment should be expedited. Procedural changes should be made by the states wherever necessary. Ready to fill formats should be circulated so that the inspecting staff does not have to write long descriptions. Cases should be received by the Range Officer, or even the Beat Officer, so that the affected farmers do not have to travel long distances to file the case or receive compensation. The entire process should be time bound. It is recommended that farmers should receive compensation within 15 days from date of the incident.

False compensation claims should be detected and rejected. Above a certain value, revenue authorities should be involved. If the amount is high, a gazetted officer should do the inspection. If the value is exaggerated, there should be penalty for false claims.

Computerization of cases of crop and property damage by elephants should be initiated by all states to hasten the process of compensation. A database should be prepared so that the data may be used in future use and manipulations are reduced.

In case of human injury the victims are sometimes seriously injured and lose their jobs and livelihood. Provisions should be made for free treatment in Government hospitals. If medicines are not available, the hospitals authorities should make the arrangement or send the patient to better hospital at their cost. The costs should be reimbursed to them directly by the Forest Department without involving the patient. Medical treatment continues long after discharge from hospital and considerable expenses are incurred. The Government should pay these expenses as long as the treatment continues, even if it takes a year or two. The affected person should be suitably rehabilitated. NGOs with appropriate expertise should be involved so that they can do the necessary hand holding for rehabilitation of the person.

In case of human death the compensation should be minimum Rs. 5 lakhs. In such cases also an NGO with requisite expertise should be involved to rehabilitate the next of kin.

18. Crop Insurance

The Pradhan Mantri Fasal Bima Yojana (PMFBY), which was introduced in 2016, provides insurance to a wide variety of crops at a very low premium. The MoEFCC has requested for inclusion of crop damage by wild animals in the scheme. As and when this feature is incorporated in the scheme the State Governments and the Forest Departments should promote this scheme vigorously in regions where there is crop damage by elephants and wild herbivores.

19. Elephant Drives

Elephant drives with the objective to push elephants from one administrative area to another should be avoided. In no situation elephants should be driven for long distances. This causes stress to the young calves in the group and they may die. Elephant drives, if at all they are carried out should be solely with the intention of herding elephants away from a human populated zone. In some situations elephants may be herded away from hazardous situations such as at international boundaries where they may be endangered. Once they are outside the human use zone or the danger zone they should be left alone. Care should be taken to ensure that the driving operation does not split the herd. This increases the conflict and also disturbs the social structure of elephant groups.

20. Early warning SMS alert systems/WhatsApp Group

Systems based on laser beams have been used on Valparai Plateau in Nilgiri Hills, Tamil Nadu to provide early warning of elephant arrival. A system of sending SMS alerts of elephant presence has been developed to warn of elephant presence. A system of pulsating warning lights on towers that warns of elephant presence in the area has been developed. These methods are useful in reducing incidents of human mortality due to encounter with elephants. These methods are useful in situations where encounters with elephants are high. Warning about elephant presence may also be advertised through local/ cable TV channels. They should be implemented in other areas where similar situation exists.

Early warning system through WHATS APP and regular broadcasting of herd locations every day and their possible route may also be followed.

21. Primary Response Teams & Rapid Response Teams

In some areas elephants are prone to enter high population density areas in large numbers. In such situations quick response by the Forest Department is important for preventing loss of human life or damage to property.

ADS have worked reasonably good in North Bengal but ADS cannot reach out to all places. We need to develop primary response team (PRT) in each village who could work as first level of defense to drive the elephant and keep crowd away till the time the Rapid Response team (RRT) reaches. The RRT should ideally consist of a biologist, veterinarian and a biologist to address all aspect of the conflict. Both the teams have to be adequately trained and equipped in HEC mitigation. The PRT and RRT should also be insured to take care of their families in cases of accidents/deaths during HEC mitigation and continuous medical facilities be provided in case of severe injury till the person recovers.

These teams should work in a planned manner and carry out the operations quickly and effectively. Their main job should be to herd the elephants away from human inhabited areas. They should be well equipped and disciplined. A 24 hour control centre should be formed in critical areas and the toll free telephone number of the control centre should be given wide publicity. Such a strategy has been used effectively by the Tamil Nadu Forest Department in Valparai Plateau and by Chhattisgarh Forest Department.

22. Minimizing Human Encounters with Elephants

Human injury and deaths are the result of human encounter with elephants. The key to minimizing loss of human lives is minimizing unexpected encounters with elephants.

In some regions for e.g. Valparai encounters with elephants often take place in low light conditions when people bump into elephants accidentally when returning from work in the evening or going for work in early morning. A large number of cases of human deaths / injuries in the country involve people who trespass into elephant habitats or indulge in collection of timber, firewood, fodder, tendu leaves, mahua and other NTFPs. The villagers visiting forests for attending nature's call often fall victims to elephants. Elephants are also known to be attracted by country liquor stored in houses. The possibility of fatal encounters is higher when the person is alone. Knowledge of these factors can help to prevent such encounters.

At the beginning of each HEC season the Forest Department should launch an awareness campaign about important Dos and Don'ts for avoiding chance encounters with elephants.

In regions where possibility of such encounters is high public alerts should be sent about presence of elephants. The SMS alert system implemented at Valparai is a good example of the effectiveness of this system.

23. Capture and relocation of elephants

In regions where elephants have moved out of the more intact forest areas, especially protected areas or large reserve forests, into human-dominated landscapes primarily for crop raiding, the levels of chronic conflicts are usually unacceptably high. These elephants may either be solitary bulls or bull groups, as well as family groups. Usually these elephants become virtually resident in commercial plantations such as coffee estates, orchards or small plantations that offer excellent canopy cover, or use smaller patches of forest (such as those regenerated under Joint Forest Management programmes) to take shelter during the day and raid the surrounding crop fields at night. Examples of these situations include districts in Karnataka such as Hassan and Kodagu with extensive coffee plantations, and southern Bengal with regenerated forests under JFM.

There may be no other option but to capture these elephants. The question then arises as to what should be the course of action after capture; should the elephants be released back into a forest or should they be retained in captivity. The first option is obviously the more desirable one when this is feasible. If a state has forests suitable for relocation, the option of releasing the elephants there should be first examined. There are indications that subadult or young adult bull elephants of the age of emigrating from their natal families are likely to settle down in another forest area through such "assisted dispersal". However, it should be emphasized that there is no foolproof guarantee of success in relocating elephants that have been in conflict with people. This is a learning process in elephant management. In the past, most experiments in capturing and relocating adult male elephants have failed with

the bulls going back to their original place of capture. Relocated elephants should be fitted with GPS-based collars to monitor their movement with the option of recapturing them in case they again come into conflict. The site of release should be at sufficient distance (typically of the order of 200-300 km or greater) such that it is unlikely that the elephant would be familiar with the new site and attempt to go back to the place of capture. "Soft release" options can also be experimented with; this would involve keeping the animal in a stockade for some limited time period at the proposed site of release before letting it free.

In some instances the best option or the only option may be to retain the captured elephant or elephants in captivity, especially if the animal has killed people on multiple occasions and the risks of release into the wild are too great. In recent times, Karnataka and Tamil Nadu have exercised this option after seeking expert opinion. Only some states have the skills to capture and train large bull elephants, and other states should build their own capacities with the assistance of the former. If elephants are retained in captivity it is essential to consider their use and their welfare.

The availability of immobilization drugs and competent veterinarians during capture operation are important issues and these should be made available to SFDs all the time.

24. Reducing Retaliatory Killing of Elephants

Communities affected by HEC sometimes resort to retaliation against elephants that can result in their death. Electrocuting is one of the common methods used for killing elephants. There are cases where the electric wire was set for other animals like wild pig or gaur and resulted in death of elephant. There is a need to introduce people to the safer option of using power fences to protect crops rather than using unguarded electric wires (power lines). Poisoning due to retaliation is also a major cause of killing of elephants. In other cases people have been known to shoot elephants. The animals are either buried (a herculean task) or the death is faked as accidental death. Sometimes bullet wounds don't kill the animal immediately but it dies a slow death later due to infection of wounds.

At the beginning of each season the Forest Department should hold meetings in all villages and warn people against using practices such as electrocution or shooting. They should be informed about the seriousness of the offence and option of legal action against the culprits in case deliberate killing of elephants.

The various measures outlined in these guidelines will help to reduce retaliatory killings. Generation of sympathy towards the animal can play a major role in reducing such killings.

25. Seasonal Planning for HEC Management

There should be effective planning at the forest division level and range level for management of HEC at the beginning of each season. This local knowledge should be tapped and used for planning HEC management for the season. Responsibilities should be allocated and strategy for HEC management should be decided.

Similar planning workshop should be held at forest range level for all the frontline staff of the range to plan HEC management for the entire season.

26. Documentation of local knowledge

In each region there is considerable local knowledge about seasonal elephant migration routes, elephant groups and their sizes, entry points and crop raiding patterns. This information is available with the field staff but generally not documented. This knowledge should be documented for use of elephant conservation and elephant management in future years. The documentation should be done in a simple format circulated by the Chief Wildlife Wardens. These documents will provide valuable information that will help in HEC management. It can also form basis of elephant conservation in the state.

27. Mob Control

Often presence of mobs makes management of HEC situations very difficult. Sometimes human deaths take place when people get in the way of fleeing elephants. In such circumstances mob control becomes an important part of HEC management. An effective mob/crowd control plan should be chalked out in areas where such situations are frequent. Help of District Administration particularly Police Department should be taken for mob control. For this communication and planning with the Police Department is necessary at the start of the HEC season. Police officers should be educated and trained about management of elephant groups so that they take prompt and effective action in such situations.

28. Managing Private and Temple Elephants

There are several instances of private elephants and temple elephants getting scared and going out of control, often during processions, due to loud music, crackers and presence of large crowd, etc. As far as possible, elephants should be kept away from congested places and large crowds. Assembly of elephants in temples or other public places should not be permitted unless the organizers have taken adequate measures to deal with any emergency. It should be ensured that the elephants, particularly bulls, participating in public functions are manned only by trained and experienced

mahouts. A dossier should be maintained of all elephants which have the history of being ill-tempered. Standard operating Procedures (SoPs) should be drafted for tackling such situations. Rapid response teams should be formed by the Forest Department in big cities to tackle such situations.

Captive elephant welfare committees should be constituted at State and District levels to ensure welfare and humane treatment of captive elephants, particularly in private custody. Chief Wildlife Wardens should periodically monitor ownership certificates/ microchips of elephants. The implementation of the guidelines for welfare and management of captive elephants, issued by the Ministry on 8.01.2008, should be enforced in letter and spirit. The Ministry has also issued on 29.09.2017 standards/ norms for giving recognition to elephant housing facilities for captive elephants, including temple elephants.

29. Managing Transboundary Elephant Movement

Some elephant populations are known to regularly cross international and state boundaries. In India this occurs regularly on the international boundary with Nepal, Bangladesh, Bhutan and Myanmar. Elephant populations regularly cross interstate boundaries in many elephant states. There is a tendency to push the elephant populations back to the home state/country using harsh methods, resulting in much hardship to elephants, especially young calves. Elephants are even shot with 12 bore shotguns. The gun shots cause injury and death of elephants due to festering wounds. Such injured elephants are extremely dangerous. All efforts should be made to avoid such practices.

Interstate coordination committees should be formed at the local level and at the level of Chief Wildlife Wardens. They should meet regularly, share information and plan for management of elephants. The practice of coordination committees should be followed even within the state between neighbouring divisions and between territorial and wildlife divisions. The Central Government has signed a MoU with the Government of Bangladesh for transboundary conservation of elephants in India Bangladesh elephant landscape on 27.7.2017 at Shillong. The Joint Working Group has been constituted by two countries to develop standard operating procedures and protocol for conservation of elephants. Similar arrangements should be established with other neighbouring countries e.g. Nepal, Bhutan and Burma.

Sympathy is needed by forest officers and people on both sides of the boundary. Strong communication should be established between forest officers on both sides to ensure that no harm comes to elephants. Elephants should be allowed to follow their natural migratory paths. Preparations should be carried out to ensure that there is minimum damage and hardship to people during their stay on the other side

of the boundary. The recommended strategy in such cases should be to prevent the movement of elephants to undesirable areas with the help of suitable barriers and to translocate / capture the straying elephants. The more experienced and knowledgeable partner should share their knowledge of elephant management and, if necessary, conduct training session for the partner on the other side of the boundary to help in managing HEC. Such dialogue should continue throughout the HEC season.

Elephants are known to be expanding their range to non-elephant districts of Northern Andhra Pradesh, Chhattisgarh, Bihar, MP, Maharashtra and Goa. Similarly, suitable elephant habitats no longer exist in parts of Nepal adjoining North Bengal and parts of Bangladesh adjoining Garo Hills (Meghalaya). The recommended strategy in such cases should be to check the movement of elephants to undesirable areas with the help of suitable barriers and to translocate / capture the straying elephants.

30. Rescue and Rehabilitation Centers

A number of elephant rescue and rehabilitation centers have been formed in the states, with support from Project Elephant. Some of these centers do not have requisite approval of the Central Zoo Authority (CZA). All elephant rescue and rehabilitation centers should get approval of CZA and follow CZA guidelines for their management. Other states that have presence of elephants should also set up at least one elephant rescue and rehabilitation centre. Elephant rescue and rehabilitation centers should be well managed and should be provided adequate funding.

Chief Wildlife Wardens should ensure that Rescue and Rehabilitation Centers for elephants as well as housing facilities for captive elephants are maintained properly to avoid complaints about cruelty/ ill treatment of elephants, received from various quarters.

31. Training of Mahouts and Kawadis

India has a long history of keeping elephants in captivity. The relationship between elephant and mahout is very complex. It is essential that mahouts and kawadis are imparted training regularly in proper handling of elephants. Registration of mahout/kawadis as trained and licensed handler of elephants with the forest department also needs to be considered.

32. Humane Treatment of Elephants

Though elephants have to be kept away from human use areas the techniques used should be humane and should not cause harm or suffering to elephants. This is especially true in case of some harsh techniques used by anti-depredation squads

and frontline staff during elephant drives. Communities also need to be educated about humane treatment of elephants.

33. Attitudinal Change

A campaign for creating awareness of elephant needs to be instituted. The Elephant Task Force has also recommended a campaign named *Hathi Mere Sathi* for this purpose. Communities also need to be educated to take responsibility in managing HEC. The community should be educated about habitat fragmentation due to encroachments and its role in increasing HEC. There is also a need to extend educational and awareness programmes for the development agencies, railways, power, irrigation, highways, mining companies, tourism industry, district administration, etc.

34. Communication

Effective communication is an important aspect of managing HEC. The recommended communication flow is given in Figure 1. The flow chart is indicative only and not meant to imply that communication flow is one way.

The Chief Wildlife Warden and PA Managers/ DFOs should decide the policy and strategy for managing HEC for the entire state. They should decide the publicity literature and training material for the frontline staff and the community. This information should be communicated to the field officers.

Figure 1: Chart for Flow of Communication of HEC Management Strategy & Literature



Figure 1

The Field officers will communicate the HEC management strategy to the frontline staff along with detailed planning for their forest divisions. They will provide the communication literature to the frontline staff. They will conduct trainings for the frontline staff for implementation of HEC management in the field.

The frontline staff will communicate the HEC management techniques to the community along with the publicity and awareness literature. They will train the community in HEC management techniques.

Communication channels between the community and Forest Department should remain open at all times to ensure good management of HEC. The community should be informed contact numbers of the local member of frontline staff in case of arrival

of elephants or crop damage. SFDs also need to set up a grievance redressal system for communities and the frontline staff.

35. Training of frontline staff and farmers

Training goes hand in hand with communication. Frontline staff as well as community should be trained in techniques for management of HEC. At present the most commonly used techniques are noise making techniques followed by drives. The stakeholders should be educated in alternative techniques for deterrent measures, early warning systems and effective repellent techniques. The training program should be coordinated by the State Director, Project Elephant.

36. Research and Development

Elephants are highly intelligent animals. They soon learn about HEC mitigation measures and become habituated to them or learn to circumvent them. Therefore many HEC mitigation measures gradually become ineffective. New techniques should be constantly introduced to keep elephants away from human use areas. Methods should be constantly altered and modified to avoid habituation by elephants. The Forest Departments, research institutes and NGOs involved in elephant conservation should carry out experiments to develop novel techniques for mitigation of HEC. The PE Division should play a nodal role in disseminating this information to the states by conducting workshops and circulating reports and publications.

We should also upfront ask for a comprehensive policy framework for elephant-human conflict mitigation. Guidelines can only be framed to help implement a policy.

Research should be carried out on a number of repellants and deterrents that need to be tried and tested in the Indian conditions before applying on a large scale to mitigate HEC.

Climate change is likely to be a major factor in near future influencing elephant behavior and habitat thereby leading to escalation of HEC. Research is required to understand the possible impacts of climate change on elephants and their habitats and develop plans for mitigating adverse impacts.

Research and Development is also required for developing reproductive control measures (using immuno-contraceptives or any suitable alternative) and protocol for dealing with local abundance of wild elephants leading to high levels of HEC and regulating captive elephant populations in camps.

There is lot of data being maintained by SFD on conflict but not effectively used except for ex-gratia support. There is no systematic analysis of the data at landscape

level to understand the pattern and level of conflict and to predict the overall trend and places of conflict hotspots based on which mitigation measures could be planned and adapted. The information could also be analyzed based on LULC the landscape to understand the main drivers of conflict and plan accordingly.

37. Assessment of HEC zone

A data base has to be maintained by each state for effective assessment of damage and compensation. But the data has to be also analyzed extensively to understand the pattern of conflict, trends and identify conflict hotspots to predict the trend and places of conflict based on which mitigation measures could be planned and adapted.

The HEC zone should be assessed and mapped for deciding on the type of intervention to be taken for conflict mitigation. The vulnerable areas should be identified and the damage to crops and human deaths should be assessed across landscape.

38. Implementers of guideline/Involvement of Stakeholders

Multiple stakeholders like MoEFCC; Ministry of Agriculture (including Department of Animal Husbandry), Ministry of External Affairs (MEA); Research Institutes; State Departments of Finance, Agriculture, Animal Husbandry and Health; District Administration; Local Bodies; Police; linear developmental agencies (Railways, NHAI, power, etc), Ministry of Homes, District Administration and Civil Societies should be involved along with the State Forest department and local communities for effective planning and implementation of mitigation measures. With so many agencies being responsible for executing the guidelines, a coordinating mechanism must be put in place.

39. Enrichment of deemed forest:

There are some good patches of 'deemed forests' or forests not under the forest department, though classified as forest according to the judgment of the Hon'ble Supreme Court. Some of them are degraded, but can be improved as good elephant habitats. They need be enriched to serve as elephant habitats.

Contents

Acronyms	3
Executive Summary	4
<u>1st July 2019</u>	
Inaugural Session	
1. Welcome Address by Shri. Rakesh Chaturvedi, PCCF	6
2. Keynote Address by Shri. M. S. Negi, ADG (WL), MoEFCC	6
3. Chief Guest Address by Dr. R. K. Singh, Retd. PCCF & HoFF, Chhattisgarh	7
Technical Session I - Presentations	
1. Presentations by CWLW of East Central Elephant Range States (Chhattisgarh, Odisha, West Bengal, Jharkhand and Madhya Pradesh)	8-11
Technical Session II - Presentations	
1. Insights on Elephant Ranging Patterns and HEC in Northern Chhattisgarh- Dr. Bivash Pandav and Shri. N. Lakshminarayanan	12
2. Key issues in Human-Elephant Conflict – Dr. A. J. T. Johnsingh	12
3. Corridors in East Central Landscape and its protection – Dr. Sandip Kumar Tiwari	13
4. Process involved in equipment and drug procurement – Dr. P. K. Malik	14
5. Elephant Capture- Options and obstacles – Dr. Parag Nigam	15
<u>2nd July 2019</u>	
Technical Session III – Working Group discussions, Presentations	
1. Deliberations by working groups and finalization of their recommendations	17
2. Managing dispersing elephant populations- Challenges and opportunities – Shri. Ajay Desai	17
3. Preventing crop damage by elephants through Community based Conflict Management Model (CBSM) – Dr. Prachi Mehta	17
4. Mobile-mediated technology for human-elephant conflict mitigation – M. Ananda Kumar	18
5. Human Elephant Interface- Conservation and conflict mitigation in Mahasamund and Balodabazar FD, Chhattisgarh – Wildlife SOS	18
6. Supporting the components of 'precision wildlife management'- Aditya Gangadharan, PhD, IUCN India Country Office	19
7. Presentation of recommendations by Working Group I and discussion	20
8. Presentation of recommendations by Working Group II and discussion	21
9. Presentation of recommendations by Working Group III and discussion	22
Closing Ceremony	23
1. Welcome address by Shri. Rakesh Chaturvedi, PCCF	
2. Address by Shri. M. S. Negi, ADG	
3. Address by Shri. R. K. Shrivastava	

3rd Regional Workshop on "Right of Passage to Elephants" to mitigate Human-Elephant Conflict for East-Central Region-Workshop Proceedings

4. Address by Dr. P. K. Malik
5. Address by Hon. Forest Minister Shri. Mohammad Aqbar
6. Vote of thanks by Shri. Atul Shukla, PCCF WL

Workshop Findings 24

Appendices

Appendix I –	Workshop Agenda	25
Appendix II –	List of Working Group Members	27
Appendix III –	List of Workshop Participants	28

Acronyms

HEC – Human-Elephant Conflict
CPEMC – Central Project Elephant Monitoring Committee
MoEF&CC – Ministry of Environment Forests and Climate Change
ADG – Additional Director General
CWLW – Chief Wildlife Warden
PCCF – Principal Chief Conservator of Forest
WII – Wildlife Institute of India
WTI - Wildlife Trust of India
WRCS – Wildlife Research and Conservation Society
NCF – Nature Conservation Foundation
IUCN – International Union for Conservation of Nature
CZA – Central Zoo Authority

Executive Summary

Human-Elephant Conflict (HEC) is one of the major wildlife related issues of this country. Due to increased human population, forest fragmentation and degradation, conflict with wildlife seems inevitable. Chhattisgarh is one of the best example for HEC. Historically, the state was devoid of elephant population. Small elephant population originally migrated from Jharkhand and Odisha during the 1980s and 1990s (re-colonization). HEC cases have been increasing from the year 2000 as the number of migratory elephants have steadily increased. Considering all factors, co-existence seems to be the key and necessity for survival of both us humans and the wildlife. Keeping this theme at the centre, the 3rd Regional Workshop on "Right of Passage to Elephants" to mitigate Human-Elephant Conflict for East-Central Region was held at Chhattisgarh. It proved to be a wonderful opportunity to bring together all experts working in the field and as well as at policy level. The Central East Region states comprises of a landscape which elephants use frequently. The state borders are only for people and no wildlife abide to human boundaries. Hence collaboration between these states is crucial to understand the larger picture of HEC. Co-ordination between states is required now more than ever to address and deal with this sensitive issue.

The workshop was conducted on 1st and 2nd July, 2019. Workshop Agenda is annexed(Appendix I). Post 2nd Central Project Elephant Monitoring Committee (CPEMC) meeting held at Ambikapur on 29th and 30th June, the workshop was held at State Headquarters AranyaBhawan. Apart from CPEMC members, officers from MoEFCC, forest department officers from PCCF, CCF to DFOs, wildlife experts from Wildlife Institute of India (WII), members of Non Governmental Organisations participated in this workshop. A list of all participants is annexed(Appendix III).

A total of 4 Technical Sessions were organised across 2 days which included presentations from CWLW of Central East Region States viz. Odisha, West Bengal, Jharkhand, Madhya Pradesh and Chhattisgarh. Non Governmental Organisations such as Wildlife SOS, WTI, WRCS, NCF, IUCN shared their work knowledge regarding HEC, elephant ecology and behaviour in various landscapes of Central East Region and other parts of the country with elephant distribution ranges.

Central East region states presented HEC in their respective states. Most common problem among all the states was fragmentation of elephant habitat and lack of good forest. Corridor movement turned out to be crucial in understanding the movement patterns and elephant distribution dynamics at landscape level. States provided conflict data for the past 10 years and more and how it has changed over the years. At present, HEC seems to be increasing across the country.

Wildlife Institute of India and various research organisations shared their research studies conducted across India. Recent techniques like satellite collaring and use of social media proved effective in monitoring elephant movement and alerting local communities to minimise the damage. A wide variety of protective measures were suggested. Since adequate financial support was lacking, low cost technologies were suggested to be used in elephant affected areas. However, appropriate budget is crucial to conduct Project Elephant activities. Policy level change is surely needed to address this issue similarly in each of the states.

After 2 days of brainstorming sessions, the conclusion for handling HEC came out to be several factors. A Strategic Action Plan is required specially for Central East Region. Interstate Coordination Committee needs to be established to help each other in dealing with HEC effectively. Getting finance to fund Project Elephant activities is crucial. Capacity building of staff is necessary to handle HEC without causing any damage to elephants or humans. Sensitizing local communities living in elephant landscapes to learn to co-exist is another important matter to look after and leave the elephants alone.

Day 1st – Monday 1st July, 2019

Inaugural Session

The workshop was inaugurated by Chief Guest Shri. M. S. Negi, ADG (WL), MoEF&CC in the presence of Shri. Rakesh Chaturvedi, PCCF Chhattisgarh, Shri. R. K. Singh, Retd. PCCF and HoFF, Chhattisgarh, Shri. Atul Shukla, PCCF WL, Chhattisgarh. Ceremonious praying of deity Saraswati was done by the guests and workshop proceeded forward.

Shri. Vishwesh Kumar, DFO Balodabazar coordinated the announcements of technical sessions and introduced speakers who gave presentations in each technical session.

Welcome Address - Shri. Rakesh Chaturvedi, PCCF, Chhattisgarh Forest Department

Shri. Chaturvedi gave a brief account of history of elephant presence in the Chhattisgarh state. There is a note in Bilaspur District Gazette which testifies that during 1700 AD period of Mughal Empire, elephants were used to be bought for the kingdom. However, there were no natural population existing in that period. During 16th to 18th century, a natural population did exist in the state and then later disappeared. After that, in 1982-83, elephants started migrating from Palamau, Jharkhand to the Chhattisgarh state. At present, post 2017-18, there are about 280 elephants in the state. A herd of 18 individuals was recorded at MandirHasod, of which 2 elephants travelled to Gadchiroli, Maharashtra and again came back. In future, we might see movement of elephants from Tadoba to Odisha after seeing their current movement pattern.

Regarding HEC, number of conflict cases are decreasing from Ambikapur district and increasing in other districts of the state. HEC is one of the burning issues during every Vidhan Sabha Session. Shri. Chaturvedi gave details of proposed Lemru Elephant Reserve. He mentioned that there are 3 villages present in the area and the Cabinet has given approval in principle for the said reserve. First discussion regarding the same has taken place and the next meeting will be conducted on 3rd August, 2019.

Keynote Address - Shri. M. S. Negi, ADG (WL), MoEFCC

Shri. Negi thanked Chhattisgarh Forest Department for conducting a successful field visit of CPEMC members at Ambikapur. He appreciated the work of the Chhattisgarh Forest Department in handling conflict situations. The major objective to solve HEC is to sensitize the public and convince them to allow wild animals to move in their natural habitats conservation is important for both elephants and people. Shri. Negi stated that findings of the CPEMC meeting and this regional workshop will yield better results to mitigate HEC in all Central East Region states. Communication between states is important and it needs to be improved further for better results.

Addressing conflict along linear infrastructure projects is very important. The guidelines formed by Ministry with the association of WII, NHAI and NTCA are to be followed religiously for conservation of wildlife. Efforts should be targeted at not constructing roads through wildlife sanctuaries. Proper construction of crossing structures is essential for passing/crossing of wildlife to avoid conflict situations. Field officers should be advised to strictly follow the guidelines issued by the Ministry.

Electrocution of elephants is high in the states of Odisha, West Bengal and Chhattisgarh. 33KV lines are most dangerous for elephants and utmost care should be taken to avoid electrocution of elephants through these lines. Ministry is taking necessary steps with the Ministry of Agriculture to modify the Crop Damage Insurance Scheme for better compensation to villagers. To prevent entry of elephants in the crop fields, lemon grass can be cultivated around villages and some villages can be developed as model villages.

Chief Guest Address – Dr. R. K. Singh, Retd. PCCF and HoFF, Chhattisgarh

Dr. R. K. Singh gave a brief history of elephant movement in Chhattisgarh state. In 1920, elephants were recorded in northern part of the state. Later elephants re appeared during 1988. During that time the state was part of Madhya Pradesh and the policy at that time regarding elephant movement was to put barrier and drive elephants away. In 1993, the state invited people from Karnataka to capture these elephants and a documentary "Last Migration" was also made during that time period. After that for 7 years, there was no migration recorded in the state. In the year 2000, elephants moved back into the state.

At present, there is need of landscape level plan for conservation of elephants and tackle HEC. The proposed Guru Ghasidas Tiger Reserve and Sanjay Tiger Reserve, MP comprises a landscape of about 4000 sq.km. There are many villages dotted across the elephant landscape and hence village relocation is a huge task. There is need to make necessary changes to current relocation policy. For elephants, CPEMC states should identify specific conservation zones and ask for funds from government to do the same. There is no capacity to manage HEC in the state.

Similarly, drug procurement is another issue and state faces difficulty in getting the drugs in time. Dr. Singh suggested that WII can have a satellite centre for training in Karnataka for ease of access. Use of latest technology like drones, artificial intelligence (AI), proper safety gears for staff is essential for managing HEC effectively. There should be uniform level of compensation provided to the conflict victims. Currently, compensation provided by Odisha is higher and lower by Jharkhand with respect to Chhattisgarh state. Adequate rescue centre for elephants and hospitals for people is important to minimize casualty cases on both ends. Inclusive governance is required for conservation of both elephants and people.

Technical Session I – Presentations

Chair – Shri. M. S. Negi, ADG (WL), MoEFCC

Co-Chair – Shri. N. K. Vasu, PCCF and HoFF (Retd.), Assam

Presentations by Central East Region states**Presentation 1 – Shri. P. K. Verma, PCCF, Jharkhand**

Shri.P. K. Verma delivered a brief presentation on HEC in Jharkhand state. He mentioned that the entire geographical area of the state was influenced by elephant movement. Following facts were presented in the presentation.

A total of 678 numbers of elephants were recorded in Jharkhand according to 2017 census by MoEF&CC. Jharkhand State has two resident elephant population zones, viz. Palamau and Singhbhum. Palamau population occupies Palamau Tiger Reserve and adjoining forest areas. Singhbhum Region, comprising mainly Saranda, Chaibasa, Kolhan, Porahat, Saraikela-Kharsawan and Jamshedpur is declared as Singhbhum Elephant Reserve.

In recent years, elephants have started moving into new areas of Hazaribagh, Ranchi, Khunti, Gumla, Ramgarh, Bokaro, Dhanbad, Giridih, Deoghar, Jamtara, Dumka, Pakur, Godda and Sahibganj districts passing through fragmented forest patches, agricultural land and human settlements. Inter-

State movement of elephants also take place within Odisha, West Bengal, Chhattisgarh, Bihar. Due to fragmentation of habitats for various reasons, elephants are changing their established migratory routes. A study conducted by WTI also showed that the corridors are disturbed which also might be the reason behind extensive elephant movement in the entire state. Around 300 individuals were believed to be roaming ones outside the resident population of the state.

Regarding HEC, a total of 302 cases of human casualties were recorded. Shri. Verma explained that the deaths occurred last month from the date of this workshop, an adolescent elephant moved away from its herd and inflicted 9 human deaths in 3 districts. He also mentioned that out of these, 7 cases were avoidable as people killed were the main cause behind this. Curious people due to ignorance or lack of common sense ventured very close to this animal and got killed in the process.

Discussion –

- Shri. M. S. Negi pointed out in the presentation to add the human and elephant mortality in the same table to better represent the data and have a clear understanding about patterns to be seen across the years. He suggested to build a short term tranquilization and rescue centre to deal with problematic animals. A proposal regarding the same can be submitted to CZA, he added.
- Shri. Sanjay Mohan, PCCF (WL) Karnataka added that expenses up to 2 lac occur per elephant at a rescue centre and hence temporary elephant camps proved to be a better option in the Karnataka State.
- Shri. P. K. Verma upon question of elephant mortality causes answered that the reason is not related to conflict. Also timely compensation to victims is paid but delay often do occur in the process of verification for each case of conflict.
- Dr. P. K. Malik, WII suggested all attendees to not to use drugs like ketamine and xylazine especially for animals that are in musth.

Presentation 2 – Shri. R. K. Sinha, PCCF, West Bengal

Shri. R. K. Sinha explained that West Bengal has two distinct elephant populations viz. North and South Bengal. Population trends for both showed an increasing trend since the year 1989 where 175 individuals were recorded from North Bengal and 4 individuals from South Bengal Population. Year 2017 data showed that the population of North Bengal is increased to 488 individuals and 194 individuals from South Bengal. North Bengal population is resident while South Bengal has both residential and migratory population. A total of 14 corridors have been identified and most of them are fragmented. Out of these, 4 corridors account for 100 elephants. Over the years, North-South migration of elephants has increased as it was shown through maps in the presentation.

Shri. Sinha stated that West Bengal accounts for 2% of all elephant population in the country yet 25% of all human deaths are recorded from this state alone. Regarding elephant deaths, he mentioned about an old railway line about 120 years' old which was earlier narrow gauge and converted to broad gauge in 2004. Since then 69 elephant deaths have been occurred. No elephant death has occurred in forest area in the past 4 years. To deal with conflict issue, 3 tranquilizer guns are available with the state forest department and staff is qualified to use these guns in the field, he mentioned.

Presentation 3 – Shri. P.K. Sahu Dy. C.F., O/o PCCF (WL) and CWLW, Odisha State Forest Department

In the introduction, it was mentioned that out of 30 districts of the state, 28 have elephant distribution suggesting that entire state was under elephant movement area. 14 corridors have been identified in the state. Census data of year 2017 showed that there were a total of 1976 elephants recorded in the state. Threats to elephant population were similar as addressed by earlier speakers which were shrinkage and defragmentation of habitat, HEC and increased threat from poachers.

A total of 402 elephant deaths were recorded since the year 2015. Majority of the cases were related to disease followed by accidents and electrocution. 13 cases of poaching were recorded through the

time span. For 62 cases, cause of death was unknown. 434 human deaths occurred during similar time frame for which due compensation was paid along with compensation for injuries and property damage with respect to house, cattle and crop damage.

To deal with HEC, following steps were taken by Odisha Government:

- A “Standard Operating Procedure (SOP) to deal with emergency arising due to straying of wild animals in human dominated landscapes” was approved. SOP provides for a Permanent Anti Depredation Committee in all divisions to deal with animal-human conflict or straying of the same into human habitations in an area and to impart technical guidance, monitoring of the situation on day to day basis. DFO is the chairman of the Committee. In case, the forest division falls in more than one district, the representatives of collectors & superintendents of police of all such districts are nominated. Normally the committee meets on six monthly bases to take stock of the situation.
- “Wildlife Protection against Electrocutation-Cell” has been constituted in each district which includes representatives from Electricity Dept., Forest, NGO, Police, etc. under the chairmanship of the collector.
- Solar fencing around the crop field has been taken up effectively in some of the divisions.
- Gajah Vehicle has been procured for mitigation of man-elephant conflict.
- Drone has been utilized to know the presence of elephant herds.
- Improved coordination & operationalisation of WhatsApp group.
- VSS / EDC are engaged for creating awareness among villagers in elephant prone areas.
- Effective issue of caution order by Forest Dept. to railway authorities - Continuous hooting in the sensitive zones identified by the State Forest Department is carried out. Locomotives are provided with powerful beams in the sections. Clearing of vegetative growth in 30 m width on both sides of the track has been done. The VHF sets of State Forest Department and Railways have been synchronized for proper communication system so that drivers can be informed of the presence of elephant herds to enable trains to slow down or stop.
- The Forest Department staff along with anti-depredation squad and local villagers of the concerned area patrol day and night and try to drive away wild elephants from the agriculture field, human settlement into the nearest forest. The Police and local people jointly participate with the Forest Department to track and monitor the migratory elephants.
- Meeting of the Inter-State Coordination Committees on elephants on Human-Elephant conflict are being organized regularly to mitigate the problems arising out of trans-boundary migration of elephants to Odisha from Andhra Pradesh. Expert Committee has been constituted in the State under the chairmanship of Principal CCF (Wildlife) & Chief Wildlife Warden, Odisha to mitigate Man-Elephant conflict in the State.

Presentation 4 – Shri. J. S. Chauhan, APCCF (WL), Madhya Pradesh

Shri. Chauhan gave brief history of presence of elephants in Madhya Pradesh. He mentioned that old working plans indicated presence of elephants in Sidhi District. After partition of Madhya Pradesh and Chhattisgarh, wild elephants came to Sidhi, Singrauli and Shahdol districts of Madhya Pradesh from 2002 to 2007, 2009, 2013 and from 2017-2019. There is no resident breeding population of wild elephants in Madhya Pradesh at present. Currently 38 elephants are present since last 6-7 months in forest areas of Shahdol and Bandhavgarh. Another herd of 7 elephants is moving in Sanjay Tiger Reserve, Sidhi since March 2019. There is no identified corridor as such in the state but Singrauli district area is probably used as a corridor.

With regards to HEC, no conflict cases have been reported till the year 2017. Death of two straying wild elephants in Sidhi district occurred due to electrocution in 2015. Destruction of property, crops

and 2 human casualties in 2018 were recorded in Sidhi and Shahdol. Destruction of solar water pumps/pipes, patrolling camps, crops and 1 human casualty were reported in 2019 in Sidhi district.

For HEC mitigation, following measures were taken by the forest department.

- Solar flashing lights were put around village boundary to prevent wild elephants from entering the villages.
- 24-hour vigil was kept by tracking party on the movement of wild elephants and the information was shared with the adjoining staff and the local communities.
- A team of staff lead by Assistant Director, Sidhi was sent to Sarguja to study the mitigation measures and response to such conflict situations.
- Elephant repelling fencing was prepared and put in and around affected villages.
- Fires with chili powder and grease was put along the village boundary.
- Grain bags were put in forest area to lead them back to their original habitat.
- An expert from North Bengal was called for driving wild elephants back to their original habitat.
- Publicity through posters/flex banners on how to avoid conflict with wild animals was taken up in the affected areas.
- The villagers were made aware of the elephant presence by way of announcements through village Kotwars and other means.
- Drones were deployed to trace the location of elephants in the forests areas.
- The effected villagers were given adequate compensation, food grains and plastic sheets.
- The headquarters were apprised daily of the situation and guidance was obtained from HQ continuously.

At the end, Shri. Chauhan made suggestions for better HEC mitigation. He explained that the conflict cannot be completely reduced to zero but surely can be minimised as much as possible. The solutions he suggested were constant maintenance of physical barriers, awareness campaign for local communities and special training for department staff to better deal with HEC.

Presentation 5 – Shri. J.A.C.S. Rao, APCCF (WL), Chhattisgarh

Shri. Rao gave a brief presentation regarding HEC in Chhattisgarh and mitigation measures done by the state to minimise the conflict. In a brief history of elephant movement in the state, he mentioned that a small elephant population originally migrated from Jharkhand and Odisha during the 1980s and 1990s (re-colonization). Since year 2000, elephant moved back into the state after a 7 years gap in the 1990s. At present, Chhattisgarh has a total of 247 elephants (2017 census report by Project Elephant Division, MoEF&CC). Distribution of elephants is mostly seen in northern parts of the state occupying almost 60% of the total geographic area of the state. Recent movement of elephants has been recorded in parts of UdantiSitanadi Tiger Reserve.

Regarding HEC, Shri. Rao explained mortality of elephants in the state for the past 10 years. A total of 119 elephant deaths occurred during this time span. About half of the deaths accounted for occurred due to natural causes. Electrocutation was found out to be the major cause after natural causes. Electrocutation cases mostly occurred as accidents. Other causes included disease and poisoning. Cases of poisoning were indirect causes and not directly related to conflict as these elephants became victims to poison which were put by villager to deal with other animals.

For human death and injuries along with property damage, the government has increased the rate of compensation. Compensation provided for human death was increased from Rs. 4 lac to Rs. 6 lac. In the year 2018-19 a total sum of Rs. 1751.57 lac was paid in compensation to conflict victims against 59 cases of human death, 41 human injuries, 22141 crop damage cases and 1743 cases of house damage. Trend in human deaths seems to be increasing for the past 5 years and showed a small decline in the past year. However, it is still long way to go to reduce human casualties.

Mitigation measures applied by the forest department were as follows:

- Collaboration with WII and Wildlife SOS to conduct scientific research and gather large number of data regarding elephant ranging patterns.
- Awareness campaign for villagers which included a daily radio broadcast "HamarHathiHamar Goth" to make people aware about daily elephant movement.
- Capacity building of department staff – training programmes for better dealing with HEC
- Distribution of equipment to field staff like high beam torches
- Use of physical barriers to restrict elephant movement near villages to minimize damage
- Use of Gajraj Van for alerting villagers about elephant movement in the vicinity
- Elephant Rescue and Rehabilitation Centre established at TamorPingla Wildlife Sanctuary to house captured elephants along with 5 kumki elephants that were brought in from Karnataka State
- Habitat development works which included developing water bodies which were proven effective by observing elephant movement using these water bodies.

Discussion Session

Dr. Prajna Panda asked a question regarding option of immunization instead of resorting to culling of elephants. Shri. Sinha responded that 90% of the killings happen to tusker elephants. Regarding culling of elephants, he stated that there should be a policy to select which individual to be culled.

Dr. A.J.T. Johnsingh gave recommendations for rescue centre at Pingla, Chhattisgarh which was visited by CPEMC team during field visit. He suggested to take care of water intake as its crucial for elephants. Neem trees can be planted in the centre, he added. If anyone is building a centre, he mentioned that one should consider a site where river crosses through a habitat which is an ideal place to put up the centre. He also explained that cement should not be used in the construction of dams inside protected areas. Instead earthen material should to be used.

Shri.Sanjai Mohan shared details regarding elephant camps in Karnataka state. He explained that there is no rescue centre in the state but elephant camps which act as temporary holding structure for captured elephants. About 7-8 such camps are present in the state which houses around 80 elephants. He explained that to establish a proper rescue centre is a huge challenging task requiring large budget of around Rs. 105 crores. Shri. Ajay Desai added that training elephants housed in camps and rescue centre is a difficult task. He also mentioned importance of revival of old techniques handed from generation to generation.

Technical Session II – Presentation by expert institutes and organisations

Chair- Dr. R.K.Singh, Retd. PCCF &HoFF

Co- Chair- Shri. Rajiv Shrivastava

Presentation I - Insights on elephant ranging patterns and HEC in Northern Chhattisgarh – Dr. BivashPandavWII

Dr. Bivash gave brief introduction on historic account of elephants in Chhattisgarh state. He explained that HEC emerged as an economic, social and political problem in the state. He mentioned that 40% of the state area fall under forests. However, good forest is rare as most of the forest area is patchy and fragmented. Presence of railway corridors, mining activities, linear infrastructures poses much threat to wildlife as not much consideration is taken into account during planning of construction of the said activities. Apart from these, local communities residing in and around forest areas, they are highly dependent on forest produce for their livelihoods. Seasonal burning of forest during Mahua

season, occur regularly. It results into clearing of the understory which destroys ground cover and most food species of herbivore wildlife in the area.

Later, Dr. Bivash explained activities conducted by his team. They have come up with a manual which shows photographic details of identified elephants in northern Chhattisgarh. Based on these identified elephants, ranging pattern were observed which yielded into good data. In an example, he showed movement of one individual which moved through northern districts of Chhattisgarh and entered into Sanjay Tiger Reserve of Madhya Pradesh state.

Satellite collaring studies were conducted by the team and 6 elephants were fitted with satellite collars. Of which 3 collars dropped off due to natural reasons. The collar provided insightful data regarding ranging patterns. Range pattern of one bull makhna named Behradev for the period of May 2018 to June 2019 showed to be 1450 sq. km. It also showed a distinct pattern in the places the male visited during musth and non-musth period. Ranging area included Surajpur, Balrampur and Surguja Forest Divisions. Another collared female named Gautami showed movement from Chhattisgarh to Odisha state. Also the path followed by her and the herd was exactly similar concluding that these animals follow the same path. Also most of the path included open terrain non-forest area and human settlements. The herd ranged in Surguja, Dharamjaigarh and Jashpur FDs in Chhattisgarh. During November 2018, the herd moved into Sundargarh FD in Odisha. In February 2019, the herd moved back into Chhattisgarh and then on to Mainpat. There were four human deaths during the period. The herd remained in large patch of forests below Mainpat for a longer duration.

Corridor movement observed in elephants was found out to be very fluid. Dr. Bivash mentioned that this fluid movement was due to diffuse boundaries in the region. Similar fluid nature was seen in individuals and also in a herd which had their own behaviour resulting into conflict situations. This makes driving elephants away from any area a tedious and unsuccessful task as elephants often follow their movement paths as they are highly intelligent animals.

Dr. Bivash explained human casualties' data which showed that most of the deaths happen in elderly people and males. Also deaths occurred majorly during night time when elephant movement is at its peak. About 40% deaths occurred near human settlements. Dispersing male elephants were mostly the main cause behind human deaths.

Presentation 2 –Key issues in Human-Elephant Conflict – Dr. A.J.T. Johnsingh

Dr. Johnsingh delivered a brief presentation encompassing the HEC throughout the country. For Chhattisgarh state, he mentioned to quantify Mahua trees as its essential for both people and elephants. He said that the elephants who raid crops are much healthier than their forest fed counterparts. He also explained the degradation of water sources due to pollution done by domestic cattle. Fresh water is crucial for elephant. Wherever there is scarcity of water, this issue can pose a serious threat for elephants residing in such water shortage areas.

Dr. Johnsingh provided statistical data regarding HEC with respect to human deaths, elephant mortality and crop damage. He explained behavioural ecology of elephants. Adult elephants weigh between 3000 and 5000kg. They need 250-300kg food and about 100 litres of water every day. They spend 16-20 hours feeding in the wild. Agricultural produce provides readily available high energy food. Crop raiding may become obligatory if there is scarcity of fodder in the forest as it is in most of our wild elephant habitats may be except in certain protected areas in northeast. Also if they have lost part of their home range to agriculture and development. Conflict is serious in Assam as large part of elephant habitat has been lost to encroachment. He gave two examples of a tusker, one named Big boss, one of the bulls radio-collared in Rajaji NP, never raided the crops as he had not lost his habitat either to agriculture or to development. On the contrary, Tippu, another collared bull, raided the crops often as he had lost considerable amount of his habitat to development.

Elephants are expanding their range, so Human Elephant Conflict in India has expanded from 132 districts in 17 states/Union Territories in 2000 to 248 districts in 23 states/Union Territories in 2018. One can easily kill a man-eating tiger or leopard and destroy the carcass totally. But this can't be done with elephants and so the problem is likely to grow in the years to come. Poor of the land will continue to suffer more.

Corridors are most important for safe movement of elephants. Dr. Johnsingh gave an example of Chilla-Motichur corridor in Rajaji Tiger Reserve, Uttarakhand. This corridor across Ganges connects two halves of Rajaji Tiger Reserve. Nearly 40 years have gone, the corridor has not been established yet. It is one of the simplest corridors in the country. Flyover for vehicles is needed. The army ammunition dump should be taken out from the area. Islands on the Ganges need to be given vegetation cover which can be done by growing native castor plants. Apart from conserving elephants, helping tribal communities living in elephant habitats is also important. He gave example of the Malasar community in Anamalai Tiger Reserve and the Kuruba community in Mudumalai-Bandipur-Nagarahole landscape.

He stated some suggestions from a report prepared by Karnataka Elephant Task Force. It stated following major points:

- Zones only for elephants and patrolling staff.
- Co-existence zone, where people and elephants try and manage to live amicably.
- Elephant removal zone where conflict is serious. Capture and train them for captivity and control the population by immuno-contraception practiced in Africa.
- Since the carrying capacity of our elephant habitats are exceedingly poor, control of the population should be a priority. Regarding elephant population estimation, Dr. Johnsingh mentioned that we need a reliable method for estimation. Present method of total count using blocks lacks common sense. With any amount of training, no one will have the courage to walk through the bushes, locate, count and classify elephants into various age and sex categories. Tuskers can be identified easily and their population can be estimated. Focusing on tuskers the needed good can be and should be done for the elephants in the country.

Presentation 3 – Corridors of East-Central landscape and its protection – Dr. Sandeep Tiwari, WTI

Dr. Sandeep Kumar Tiwari gave brief introduction regarding details of increased HEC. Around 400-450 human death occur every year due to elephants. About 100 elephant deaths are reported due to man-made reasons. About 310 elephant mortality accounted by train hit (1987- June 2019); 55 in Central India. Central India has 10% elephant population but has 45% of HEC cases reported. In Odisha, 71 elephant deaths occurred in 2018 of which 90 per cent deaths were human-caused.

India has a minimum of 101 elephant corridors today compared to 88 in 2005. Use of corridors by elephants paints a different picture. Almost half of the corridors are not used by elephants. Corridors have become narrower today. 76% corridors are of width 500 mts or less today compared to 30 % in 2005. 65% were 1-3 kms wide. 35% corridors are of length 15 kms or more compared to 15% in 2005. About 88% of corridors have forest, agriculture and settlements. Only 8% of the corridors free of human settlements.

Dr. Tiwari presented examples of 11 corridors in Jharkhand-South West Bengal. Major threats to these corridors were various kinds of encroachments. Similar problems were seen in 12 corridors between Jharkhand and Odisha. Corridors in Chhattisgarh however showed a different picture. He explained that there are no specific corridors and the elephant movement is spread over much larger area.

Major threats to corridors were explained to be lack of legal protection, lack of sound land use policies in elephant habitats, lack of awareness among local communities and other stakeholders and

fund allocation by Govt. to secure the corridor by either land purchase/ voluntary relocation of people or through community intervention.

For conservation and management of corridors, Dr. Tiwari suggested following points:

- All identified corridors to be notified as state Corridors
- Provide legal protection to all identified corridors. This could be under various laws appropriate for the state and corridor
- Declaring as Ecologically Sensitive Area/ Eco-fragile area
- Community or Conservation Reserve
- Increase boundary of existing PA and add corridor
- Declaring corridor land as RF or PF
- Other relevant state laws (Village Reserve Forest)
- Working plan of Forest Division/ Management plan of Protected Areas should include corridors in their area with clear conservation plan.
- Elephant corridors facilitating multiple species (especially tigers) should be given high priority and should be jointly secured along with NTCA and included in conservation plans of Tiger Reserves.

At the end, Dr. Tiwari provided an example of community lead organisation named "Green Corridor Champions" which includes group of individuals charged with the responsibility of sensitizing, motivating and mobilizing the local communities for securing corridors. Their role includes noting and finding solutions for potential threats and land-use changes in the corridor landscape; analysis of wildlife movement patterns through the corridor and in the connecting habitats; undertaking awareness activities under GajYatra by involving the local community in the corridor area and working with local authorities and sensitize local politicians/ legislators on importance of the corridor and its legal protection.

Presentation 4 - Procedures for Procurement - Wildlife Restraint and Wild Animal Immobilization Anesthetic Drugs - Dr. P. K. Malik, WII

Dr. P. K. Malik gave introduction on different types of drugs which are used for restraining an immobilizing wild animals. There are 4 types of such drugs viz. Narcotics, Cyclohexamines, Sedatives and Tranquilizers. Narcotics are needed for animals like elephants, wild buffalo, rhino and gaur. Tranquilizers used only helps calming the animal by reducing stress during capture, transportation process. For carnivores, sedatives are used. Right dosage of drug is very important otherwise it can prove fatal to animal.

Dr. Malik provided examples of immobilizing drugs which are as follows:

- Traquilizers (Diazepam, Haloperidol, Acetylpromazine, Azaperone, perphenazine)
- Sedatives (XylazineHCl, Medetomidine)
- Dissociatives (Ketamine HCl, Tiletamine)
- Narcotics (Etorphine, Carfentanil, Thiafentanyl)
- Details of the relevant acts were given along with responsible authority implementing the act. Drugs and Cosmetic Act India, 1940 and Narcotic drugs and Pyschotropic Substances Act, 1985 were to be considered.

Procedure to procure drugs contains following 3 steps:

1. "No Objection" from DADF, Ministry of Agriculture
2. Drug Import License/Permit from Drugs Controller General India - After obtaining "NO OBJECTION" from DADF, Ministry of Agriculture, apply for drug Import Permit from Central Drugs Standard Control Organisation.
3. Import License/Permit from Narcotics Commissioner, Govt. of India - In case of Narcotic Drugs and Psychotropic Drugs such as Ketamine Hcl, an additional import permit from Narcotics Commissioner, Govt. of India is also required.

- a. Possession Certificate/License and Transport Permit from Excise Commissioner of the state where the drugs are being imported
- b. Fill Form IMP -1 available in the website of the Narcotic Commissioner, Govt. of India (<http://www.cbn.nic.in>)

For safe immobilization and transport of wild animals, following requirements are necessary:

- Formation of a team
- Wildlife Manager, Veterinary Medical Officer, Range Forest Officer and Frontline Staff
- Training of veterinary medical staff in wildlife management and wildlife science
- Training of veterinary medical staff in restraint and immobilization of wildlife
- Education and training of frontline staff in biological attributes of species
- Field training in animal handling
- Skill enhancement in use of forestry implements

Dr. Malik then mentioned special training programs which can help in capacity building of department staff.

Training in wildlife restraint courses

- Attendance at the Wildlife Capture Course, Zimbabwe with one-week attachment at Veterinary Unit of Kruger National Park in South Africa and Hoedspruit Endangered Species Center located near Kruger National Park(03 Week3). Dr Chap Masterson, Director, Zimbabwe Wildlife Veterinary Trust, 58Arcturus Rd, Highlands, Harare, Zimbabwe. Cell:+263 77 486 1238 <http://wildlifecaptureafrica.com>
- Zoo, Exotic and Wild Animal Aesthesia(ZEWA) Course organized by Wildlife Pharmaceuticals/Tsavran Pharmaceuticals South Africa, 38 Wilken Street, Rocky Drift, White River, 1240, South Africa P.O. Box 2673, White River, 1240, South Africa. Email:admin@wildpharm.co.za Ph: +27 13 751 2328 135 JU Tipperary, Ngongoni Game Farm, TipperaryConservancy, Karino, Nelspruit,1204.+27(13)0071217sourcetreecourses@wildlifevets.net, <https://www.wildlifevets.net/zewac.html>

WII also conducts a course entitled "Interventions in wild animal health – Field Course". It will be conducted at Sariska Tiger Reserve in February 2020. Dr. Malik provided a state level organisational structure for wildlife veterinary services for better handling this task at field level.

Presentation 5 – Elephant Capture – Options and Obstacles – Dr. Parag Nigam, WII

Dr. Nigam gave different examples regarding elephant capture and the experiences learned in the process. An elephant was captured who came from Rajaji Tiger Reserve, upon releasing it into the tiger reserve, the animal again went back to the place of capture which was a human settlement outside the protected area. This showed that only capturing and releasing elephant isn't enough as elephants remember the routes they travel on and can return back. In North India, Kumki elephants are not used to drive these problematic elephants.

A detail on restraining devices used to capture elephants were given. The devices must take into account of basic elephant biology. The position into which an elephant is kept while capturing and transportation process is very crucial. Putting all the pressure near its breast region is not good for the animal as the restraining device can cause harm to the animal or even death in some cases. The vets should be properly trained in handling this task and be ready for any emergency situation. There should be a checklist of procedures and equipment to be used.

A well trained staff and adequate equipment along with transportation vehicles are necessary to have a successful elephant capture.

Discussion

Dr. Prachi Mehta put a question regarding way forward to deal with HEC in Chhattisgarh with special reference to mining activities in the state. Dr. R. K. Singh replied saying that development is necessary for the society. Also it is a political issue and interest driven activity. For conservation of wildlife and elephants, a well educated society is important to understand the complex issues of HEC and science alone is not enough to solve this issue.

Day 2 – Tuesday 2nd July**Working groups discussion**

Three groups were formed to discuss following topics:

Working Group I – HEC – Analysis and way forward

Working Group II – Management (Interstate coordination)

Working Group III– Crisis situation: Handling elephants/drugs/capacity building of local vets

The discussion was held and a presentation was prepared for each group. The groups delivered their findings after the presentations by expert organisations

Technical Session III – Presentations by expert organisationsPresentation 1 – Dispersing elephants: Opportunities and challenges – Shri. Ajay Desai, WWF

Shri. Ajay explained details on how elephants disperse in a landscape and challenges people face in the process. Major reason behind dispersal is no forest for them to disperse to. Mostly younger males which are not mentored by adults tend to disperse more. Bulk of the males are below the age of 20. They are forced to move through human use areas (overcome fear of such areas) and forced to live off crops (become habitual and obligatory raiders) and overcome fear of normal driving/scaring tactics. Therefore, for next generation this situation is natural and normal – they do not know what life is in a forest. Hence crop raiding is their normal behaviour. It needs to be considered that such dispersal of elephants will never stop as though forest is there, but suitable habitat for elephant is scarce. Elephants have scattered throughout the country comprising of different regional populations. Central Indian population is the fragile and population viability is crucial for survival of the species.

Shri. Ajay later explained use of physical barriers to stop the elephant movement. He stressed on proper construction of barriers keeping in mind elephant's behaviour. In Karnataka, they are using old rail fencing which is highly expensive costing up to Rs. 140 lakhs/km. Instead he suggested to use hanging fencing which cost around Rs. 2.5 lakhs/km and is a better option. The barriers should be placed at appropriate places especially at weak spots like water ways in a habitat. A report published by Karnataka Elephant Task Force described three zones as a mitigation strategy viz. Elephant only zones (involute space for elephants), co-existence zone (both people and elephants) and no elephant zone (areas where long-term elephant conservation is not possible and conflict is high). Such zonation can help the decision making process in long term conservation.

Habitat security and metapopulation management for preservation of genetic diversity is essential. Collaring of elephants should be done at the right time and not during musth period which can result into collar dropping incidences.

Presentation 2 – Community based management of elephant conflict in North Kanara District: An overview – Dr. Prachi Mehta, WRCS

Kali Tiger Reserve falls under North Kanara District where northern most elephant population in Western Ghats occur. It's a satellite population having around 70-80 individuals. The habitat is mostly forest area interspersed with farm lands near the fringes of the forest area. So there is a clear boundary between these two different habitats. The elephants here mostly stay inside the forest from February to August and venture outside to feed on crops during August to January. Paddy, banana and coconut are the major crops cultivated in this area.

Dr. Mehta and her team is working in this area and practicing Community-based Elephant Conflict Management (CBCM) which was initiated in the year 2010 and going on ever since. Basic principles of CBCM are as follows.

- Participatory model of conflict management
- Empowering farmers in crop protection
- Promotion of low cost tech and innovative crop protection measures
- Self sustaining with easily transferrable technology

Different types of deterrents are used to drive away the elephants which are as follows:

- Farm based deterrents – Night guarding
- Chilly based deterrents – use of chilly smoke
- Bee hive fencing – pot and log hives – also beneficial for honey production
- Device based deterrents – Trip alarm, flicker lights – low cost and effective

Such low cost measures are tested on try and work basis. Number of farmers using these innovative crop protection measures have increased over the years. Also success rate of all these measures is above 70% and hence proven effective in this region.

WRCS conducts workshop on hands on training n crop protection in different states for forest department staff, farmers, researchers and corporate companies. Local communities are also involved in providing incentives which also helps conservation. Production of handicrafts on theme of elephants, preparation of paper by using dung are some of the initiatives undertaken.

Presentation 3 – Mobile-mediated technology for human-elephant conflict mitigation – Shri. M. Ananda Kumar, NCF

Shri. Ananda Kumar explained HEC in Valparai and adjoining region in Tamil Nadu state. He focused on three contrasting landscapes viz. Valparai, Hasan-Kodlipet and Coimbatore Forest Division. Valparai has an area of 220 sq. km. and around 100-120 elephants use this habitat. There are 220 villages in Hassan. More number of human casualties were recorded from Coimbatore Forest Division followed by Valparai and Hassan-Kodlipet region. More than 50% of the deaths occurred on roads.

Creation of help lines and Rapid Response Team were some of the steps taken by Tamil Nadu and Karnataka Forest Department. Around 2000 alerts were issued everyday in around 148 villages in the region. People's response to alert calls increased and more people subscribed to these calls to get updates. 23 lives were saved from year 2003 to 2018 with the help of this alert system. To conclude the presentation, the simple and adaptable techniques will ensure better participation by people.

Presentation 4 - Human Elephant Interface- Conservation and conflict mitigation in Mahasamund and Balodabazar FD, Chhattisgarh - Wildlife SOS team

A brief history was given regarding elephant movement to the study area from Odisha. A baseline survey was conducted in this area with following objectives:

- To understand elephant movements & identify specific causative factors leading to Human-Elephant conflict

- Testing/using GPS collars as early warning alert system
- Capacity Building & Training for FD frontline staff
- Generate awareness among local communities
- Train people in conflict avoidance behaviour

In the study area where the team monitored HEC, it was found that crop damage was more than any other type of damage due to HEC. The team conducted radio collaring studies to monitor elephant movement. It was found that elephants move out of the forest during cropping season and move back to forest during non - cropping season which was evident that they preferred the crops for their dietary needs. MFP collections and forest fires caused negative effect on elephant movement. Forest fires made elephants to move out of the forest.

To reduce conflict, early warning system was devised. Alert messages were sent using WhatsApp applications along with Rapid Response Force of Chhattisgarh Forest Dept. Along with making people aware about elephant presence, capacity building and training programmes were organised for frontline staff and security forces. Similar programmes were also conducted for local communities.

Presentation 5 - Supporting the components of 'precision wildlife management - Shri. Aditya Gangadharan, IUCN

Following points were highlighted to conduct management practices efficiently:

- Identify potential conflict situation in space and real-time
- Characteristics of that situation (e.g., demography, behaviour of an elephant)
- Informing the right people
- Rapid response for that specific incident
- Ability to change all the above when circumstances change (nimbleness)

Shri.Gangadharan gave examples which were put forward by previous speakers and suggested how to deal with conflict situations. A software based programme can be used effectively. He showed a dashboard of such a software where all the data of HEC was plotted on a map and it was interactive giving all the details regarding each conflict case. The interface was easy to interpret and could also be used in the field over a mobile phone. Live elephant location update can also be shown in the software to make staff aware about elephant movement in their respective area.

Artificial intelligence (AI) software that can identify elephant from photos/videos will be helpful in the field. Free and open source platforms are good to be used by anyone. Applications can be used for early warning for conflict situations and avoiding train or road collisions.

The system works in a systematic way. Once the user upload a picture on the software, the AI identifies the data in real time. Based on the result, automatic alert is send to respective responsible authority. It alerts Forest Dept Rapid Response Team and also local communities. Such software are available and can be used anywhere where conflict is prevalent. Such system will surely help in minimising the HEC if not totally stop it.

3rd Regional Workshop on "Right of Passage to Elephants" to mitigate Human-Elephant Conflict for East-Central Region-Workshop Proceedings

Working group presentations

WG I - HEC – Analysis and way forward

Chair - Shri. B. K. Singh

Co-Chair - Dr. R. K. Singh

Causes -

1. Habitat loss (encroachment, diversion for development)
2. Fragmentation (corridors, linear infrastructure and decrease in habitat)
3. Degradation (Anthropogenic pressures and weeds)
4. Disturbance (mining, naxal activities)
5. Water availability
6. Barrier for free passage
7. Local culture and lifestyles

Nature of conflict -

- Regular or normal conflict at the interface of elephant habitat and human use area
- Dispersing elephants which have moved out of their natural habitat and are in search of new habitat (have different behavior where they have got habituated to crop raiding)
- Human errors (lack of capacity/awareness; local cultural practices) which exacerbates conflict

Suggested Solutions -

- Drivers/causes
 - Integrated land use planning and development
 - Cross sectoral cooperation in managing HEC (all line departments participate in this)
 - Improve livelihoods to reduce dependency on forests
 - Habitat improvement interventions (restoration)
 - Securing and restoring corridors
 - Central government policy and financial support for HWC
- Sustainable funding for Human Wildlife Conflict (HEC included) through HWC Fund. All those activities which cause elephants/other wildlife to disperse or cause conflict in their existing or new habitats

Preventive methods -

- Resettlements of vulnerable settlements
- Barriers
- Capacity building and awareness within local communities and amongst departmental staff
- Awareness building in line departments
- Population management (immuno-contraception)
- Early warning systems
- Rapid response unit (departmental and community)
- Increase PAs or consolidate PAs into larger unit
- Improve agricultural practices (value addition, alternate crops)
- Interstate crisis and mitigation management committee for cross border issues
- Proper safety tools for frontline staff
- More research on behavior of conflict animals
- Conflict database to help understand the larger conflict situations

Compensation -

- Improve in terms of delivery and value ex-gratia
- In case of death, handholding of affected families to ensure family stabilizes
- Improved insurance for staff involved in dangerous tasks (particularly daily wage workers)

WG II - Management (Interstate coordination)

Chair - Shri. M. S. Negi

Co-Chair - Shri. Rajiv Shrivastava

Issues -

- Frequent cross border movement of elephants
- Clear understanding of home State
- Stay pattern varies according to season, terrain
- Identify passages across borders
- First tendency is to prevent entry of herds in respective State
- GoI has already given Guidelines for Interstate Coordination
- But still remains at personal level

Good practices in each state -

- Each State knows the entry / exit points
- WhatsApp Group within Divisions
- SMS Alerts
- Radio Broadcast
- Elephant Dossiers, linking to clan behaviour

Recommendations -

- Map the Home Range and movement in time / season.
- Allow migration but prevent dispersal.
- Exchange Phone numbers of adjoining Divisions, make a WhatsApp Group across borders
- Do not stop movement of herds across borders. Try to facilitate smooth passage with appropriate warnings
- Sharing information of exit from one State to the neighbour at Division / Range level.
- At least monthly meeting at Division / Range during migration / dispersal.
- Bi-annual meeting of Interstate Committee, with submission of summary records to MOEF& CC.
- To handled the HEC in area where high HEC, presence of Mahout's and Veterinarians are required, therefore, it is required to fill the vacancy of mahout and vet in these areas.
- Also opening of the training centre for these mahout is essential, the state like Assam, WB, Karnataka and Kerala may imitate the training centre for mahouts, so that, the vacancy can be filled with trained mahouts.

Responsibility -

- **GoI**
 - Make SOP with all element given under "Recommendations"
 - List of Border Divisions / Ranges
 - Home Range of the elephant population, Loners
 - Capacity building for HEC management
- **States**
 - Give all above data in specified timeframe
 - Share expertise across borders

Data needed -

- Nodal Office for each State
- Entry / Exit Points with neighbour
- Periodicity in time and season
- List of Division / Range for above, maybe villages also
- Contact phones, emails
- List of expertise available, facilities that can be loaned on request

- It was suggested to give these details to GoI within 10 days from the date of the workshop

WG III – Crisis Situation: Handling elephants/drugs/capacity building of local vets

Chair - Shri. Hari Kumar

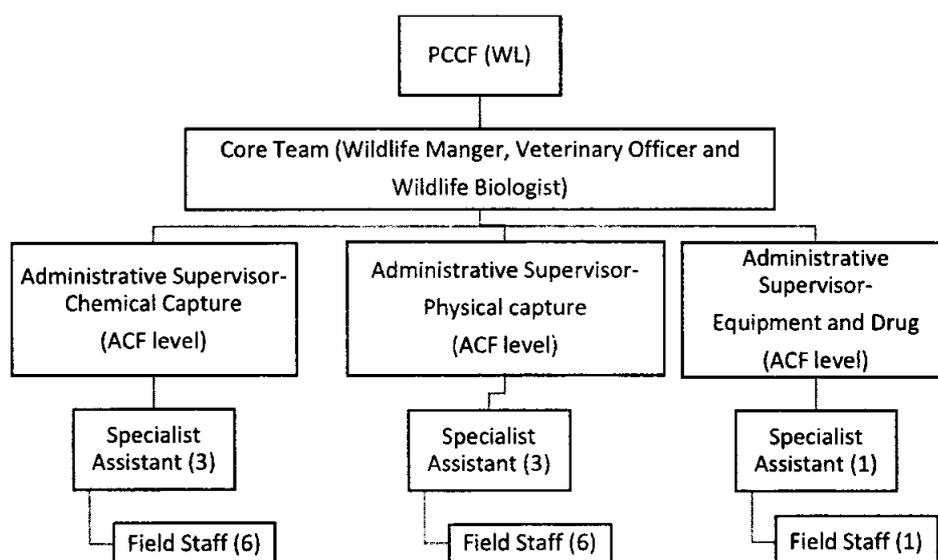
Co-Chair - Dr. P. K. Malik

Interventions are required for management of an elephant/herd in distress or where there is possibility of human damage and property and interalia risk involved with safety of elephants. There are 2 major components of crisis management which are human resources and infrastructure.

Human Resources (HRD)

Specialized force comprising of manager, biologist, veterinarian for resolving crisis situations is important. Specialized trainings must be ensured to all team members.

The team presented an organisational structure which is as follows.



- Have a separate cadre of vets.
- Vehicle for transportation of team as well as animal translocation should be ready.
- Tool kit should be readily available.
- Equipment for physical and chemical capture should be readily available and maintained.
- Procurement of etorphine is difficult. The process of needs to be streamlined.
- Interstate cooperation for sharing resources (human as well as equipment) has to be institutionalized.

Physical infrastructure

- Well designed space for equipment and similar resources at a vantage station
- Well designed vehicles for transportation of animals
- Field vehicles for transportation of team and equipment
- Other equipment and implements should be kept ready

Training

Who requires training:

- Administrative Supervisors/Specialist Assistants/Field Staff
- Wildlife managers and Veterinary officers
- Forest Guards will require specialized training for their type of expertise.

- Training of trainers

Who imparts training:

- Various specialized organizations/agencies such as WII, Wildlife Trust of India (WTI), Wildlife SOS (Agra) and any other agency.

Courses existing - In Country

- Diploma course in WII- WL Managers and Veterinarians
- Locally designed training modules should be prepared as per the requirement in the area.

Courses in Physical and Chemical Capture/ Rescue and Rehabilitation International

- Wildlife capture course in Zimbabwe
- Wildlife pharmaceutical course in South Africa
- Collaborative association training, the best place is Kruger NP/ South African Parks/Kenya for 6 months.
- Courses in Captive Management – Large North American/S. African zoos (Min 6 months)

Other recommendations

- Mock drill should be done.
- Knowledge and skill enhancement in occupational hazards
- Orientation of local communities.
- Orientation on crowd management is important
- Orientation of media in forest areas. Media sensitization workshops.
- Training and awareness for Police, Panchayats, local people, revenue dept. etc.
- Immediate payment of ex-gratia on field should be focused.
- Development of basic guidelines on handling crisis situations
- Education and communication with local communities

Concluding Ceremony

Chief Guest - Shri. Mohamad Akbar, Hon'ble Minister of Forest, Chhattisgarh Govt.

Shri. Rakesh Chaturvedi, PCCF, CGFD welcomed and introduced Hon'ble Minister of Forest Shri. Mohamad Akbar to all workshop participants. Shri. M. S. Negi provided brief details of the workshop and CPEMC meeting held at Ambikapur. The field visit was successful and the team members visited elephant affected villages and interacted with villagers. He mentioned that inter-state communication is essential to get updates on elephant movement. Requirement of mahaut is needed for Kumki elephants housed at rescue centre in Pingla.

Shri. R. K. Shrivastava explained that around 400-500 people are killed every year in the country. There are a total of 4 elephant populations viz. North, South, North East and Central East. About 10% elephant population is found in Central East region which is responsible for 45% of human casualties. To deal with HEC, a Strategic Action Plan is needed specifically for this region. So far 213 meetings have been conducted in this regard and findings of this workshop can be added to the action plan.

Dr. P. K. Malik stated that a discussion is necessary to come up with inter-state solution. He asked for support from Shri. Akbar so that Chhattisgarh state can become an example in taking forward HEC mitigation in the country. Capacity development is of utmost importance as HEC procedures are very time consuming and everyone should be well trained to handle HEC.

Shri. Mohamad Akbar explained the financial resources of the Chhattisgarh state. He mentioned that the state has low financial resources. He promised to work hard to get the finance to support HEC issue. He gave information regarding notification of Lemru Elephant Reserve. For 15 years, Lemru was not declared due to some issues regarding coal mining in the said area. But in order to save elephants, it is important that elephants are made the first priority. In the end, he once again assured to provide support and financial requirement to better deal with HEC in Chhattisgarh state.

Shri. Atul Shukla, PCCF (WL) provided vote of thanks. He thanked all Chief Guests, experts from institutions and organisations, forest department officers and staff.

The workshop was concluded with a group photo session.

Workshop Findings

- The Standard Operating Procedure (SOP) for Human-Elephant Conflict should be prepared for ensuring smooth, prompt and effective exchange of information between the officers of the bordering States to track the movement of elephants. The major objective of the Standard Operating Procedure will be to ensure delivery of information in advance from the officers of the State from where the elephants are moving to the officers and the public of the States where these elephants are entering. The SOP should have the provision for regular periodical meetings between officers of the two States at different levels from the Chief Wild Life Warden to the Divisional Forest Officers and Range Officers of the bordering divisions/ranges of the two States. **(Action: PE Division, State FDs)**
- The State Government of Madhya Pradesh and Chhattisgarh in consultation with Ministry of Environment Forest & Climate Change shall strive for creating a larger elephant landscape involving the Protected Areas like Guru Ghasidas Wildlife Sanctuary in Chhattisgarh and Sanjay Tiger Reserves in Madhya Pradesh and adjoining forest areas so as to contain the dispersal of elephants in human dominated areas. **(Action: Chhattisgarh and Madhya Pradesh FDs)**
- Identification of Elephant Corridor and animal crossing points across the linear infrastructures passing through the PAs and these corridors to better understand

movement patterns and apply mitigation measures to reduce HEC. Declaration of identified corridor as well as animal crossing points across the linear infrastructures passing through these PAs and corridors is crucial. **(Action: PE Division, State FDs)**

- Interstate committee is of utmost importance to deal effectively with HEC issues, prevailing in the region. The Ministry should urgently issue a notification creating Inter State Committee for the region (State level) comprising of ADG (WL), IGF (PE) and CWLWs of the region. The notification should describe mode of operation of the Committee including periodicity, quorum of the meeting, intersectoral linkages etc. Decisions taken during the meetings should be communicated to the Project elephant Division, which should keep track of its implementation. **(Action: PE Division)**
- Inter State Committees (District level) should be established at interstate boundaries through which elephants cross into other state. DFOs and PA managers should be primary members of the committee. It may also include representatives of the elephant depredation and local NGOs. The Committee will monitor day to day movement of elephants during elephant migration and standardize system of alerts and tackling of conflict situations. PE Division should seek inputs from CWLWs of the region like location of animal crossing points (interstate), proposed members of the committee, linkages with CWLWs/PE Division etc. and issue necessary notification. CWLWs should provide requisite information in time bound manner. For purpose of convenience, a Nodal officer may be appointed for this purpose in the office of each CWLW. **(Action: PE Division and CWLWs)**
- District level committee needs to be established having members of related stakeholders like district administration, railways, roads and linear infrastructure dept., animal husbandry dept., etc. to deal with HEC effectively. **(Action: State FDs)**
- The State Governments of Chhattisgarh, Madhya Pradesh, Odisha, Jharkhand and West Bengal should establish the divisional human-elephant conflict management teams in the divisions having problem with higher instances of HEC. Such teams should necessarily include sufficient number of trained kunki elephants to control wild elephants, the trained mahavats and veterinary officers/compounders/assistants. **(Action: State FDs)**
- Posts of permanent veterinarians and mahavat should be created in elephant affected areas for better dealing with emergency situations. Provision of adequate equipment and regular training of vets at District level should be imparted for capture and tranquilization of elephants. **(Action: State FDs)**
- The mahavat training schools should be established in states like Tamil Nadu, West Bengal, Assam etc. So that the traditional expertise of the mahavats available in these states can be used to create a force of trained mahavats to handle kunki elephants and the wild elephants involved in the conflict.
- The State FDs should explore the feasibility for establishing elephant rescue and rehabilitation areas/centres involving larger landscape where the rescued elephants can be kept in their near natural environment and submit proposals to the Ministry/CZA.
- Timely procurement of tranquilizing drugs and their antidote is extremely important for effective handling of HEC incidents. There is a need to establish a system of procurement of tranquilising drugs through Wildlife Institute of India. PE Division will take suitable steps in consultation with CWLWs and WII. **(Action: PE Division, WII and CWLWs)**
- A common compensation policy may be established throughout East Central Region states. **(Action: State FDs)**

- State Governments should expedite the relocation of villages which are residing inside or near elephant corridor and common observed movement paths. **(Action:State FDs)**
- Alternate cropping should be encouraged among villagers such as plantation of lemon grass cultivation around villages as it is effective in driving elephants away. State Governments should handhold the communities in adopting the alternate cropping. **(Action:State FDs)**
- Use of low cost methods using local materials should be promoted to reduce crop depredation by elephants. WCRS, Pune based institution, has done extensive work in this area. Its services may be required to train frontline field staff and villagers in these techniques. Villagers may be persuaded to take cultivation of crops, which are not relished by elephants and other wildlife. **(Action: PE Division, CWLWs and WRCS)**
- New and proven technologies and innovative methods for control of HEC e.g. use of drones, satellite tracking of radio collared elephants, mobile and hanging fences, alternate cropping methods, rapid Response Teams, Advance Alerts etc. should be encouraged. **(Action: PE Division and CWLWs)**
- Capacity building of departmental staff on Hands on training to staff to learn new techniques and methods. **(Action:PE Division,State FDs)**

APPENDIX I - Workshop Agenda**1st JULY 2019 (Monday)**

Inuagural Session	
9:00 -9:30	Registration of Participants
9:30 - 9:40	Welcome address by Shri Noyalthomas, IGF (PE), MoEF&CC
9:40 - 9:50	Address by Shri RC, PCCF (HoFF), Chhattisgarh
9:40 - 10:05	Keynote address by Shri M.S.Negi, ADG (WL), MoEF&CC
10:05 - 10:20	
10:20 - 10:25	Launch of Identification Manual of Wild Elephants of Northern Chhattiagarh
10:25 - 10:30	Vote of Thanks by Shri. R.K. Shrivastava
10:30-11:00	Tea Break
Technical Session I	Conflict
11:00 - 11:15	Presentation on Human Elephant Conflict in Chhattisgarh by Shri J.AC.S.Rao, APCCF (WL), CG
11:15- 12:30	Presentation by CWLWs of East Central Elephant Range States (Odisha, West Bengal, Jharkhand, Bihar & Madhya Pradesh)
12:30- 1:30	Discussion on mitigation of HEC issues of East Central Region
1:30 - 2:30	Lunch
Technical Session II	Monitoring
2:30- 3:00	Presentation by BivashPandav/Laxminarayan (WII)
3:00-3:20	Presentation by S.S.Bist
3:20 - 3:30	Discussions
3:30 - 3:45	Presentation by IGF(PE),MoEF&CC on HEC issues in the country - An Overview
3:45- 4:00	Tea Break
4:00 - 4:20	Presentation by Dr. P.K.Malik - Process involved in equipment and drug procurement
4:20 - 4:30	Discussions
4:30 -5:30	Presentation by Dr. Parag Nigam: Elephant capture- Options and Obstacles
5:30 - 5:45	Formation of two working groups:
	Working Group I: Analysis of the causes of HEC in the region and nature of the conflicts - Ways and means of addressing HEC in East Central Region
	Working Group II: Management issues relating to Budget, staff shortage and logistics etc.
2nd JULY 2019 (Tuesday)	
Technical Session III	Role of Civil Societies
9:30 - 11:00	Deliberations by working groups and finalization of their Recommendations
11:00- 11:15	Tea Break

3rd Regional Workshop on "Right of Passage to Elephants" to mitigate Human-Elephant Conflict for East-Central Region-Workshop Proceedings

11:15 - 11:35	Presentation on "Managing Dispersing elephant populations - Challenges and opportunities" by Ajay A Desai
11:35- 11:45	Discussion
11:45 - 12:05	Presentation on "Preventing Crop Damage by Elephants through Community-based Conflict Management Model (CBSM)" by Prachi Mehta, WRCS
12:05 - 12:15	Discussion
12:15 - 12:35	Presentation on "Use of Mobile Technology in Conflict Management" by Anand Kumar, NCF
12:35 - 12:45	Discussion
12:45 - 1:00	Corridors in East Central Landscape and its Protection by WTI
1:00 - 2:00	Lunch
Technical Session IV	
2:00 - 3:00	Presentation on Best Practices by States
3:00 - 3:15	Presentation of recommendations by Working Group I and discussions
3:15 - 3:30	Presentation of recommendations by Working Group II and discussions
3:30 - 3:45	Tea Break
Concluding Session	
3:45 - 4:30	Finalization and adoption of recommendation of Working Group I & II
4:30 - 5:00	Address by the Chief Guest (Hon'ble Minister of Forest/Additional Chief Secretary (Forest))
5:00 - 5:15	Vote of Thanks by Chhattisgarh Forest Department

APPENDIX II - List of Working Group members

WG-I	WG-II	WG-III
HEC - Analysis and Wayforward Venue : SCH, Second Floor Time : 9.00 am	Management (Interstate Coordination) Venue : TCH, Third Floor Time : 9.00 am	Crisis Situation: handling of elephants/drugs/capacity building of local vets Venue : FR-19 Conference Hall, First Floor Time : 9.00 am
Shri. B. K. Singh (C)	Shri.M.S.Negi (C)	Shri.Harikumar (C)
Dr. R. K Singh (CC)	Shri. Rajeev Shrivastava (CC)	Dr. P. K. Malik (CC)
Shri. Ajay Desai	Shri. JACS Rao	Dr. Parag Nigam
Dr. AJT Johnsingh	Shri. R. K. Shrivastava	Shri.Arun A. Sha
Dr. Bivashpandav (WII)	Shri.Venkatachelam Sir	Mrs. Prajna Panda
Shri.Anand Kumar	Shri. K. K. Bisen	Shri. B. AnandBabu
Shri. N. K. Vasu	Shri. P. K. Varma	Dr. Pranay Mishra
Shri.SehKazmi	Shri. J. S. Chauhan	Shri.KartickSatyanarayan
Shri. Jayant Kulkarni WRCS	Shri.Sanjai Mohan	
Dr. Prachi Mehta	Dr. MutamizhSelvan	
Shri.Swaminathan	Dr. S. K. Singh	
Dr. Sandeep Tiwari	Shri. R. K. Sinha	
Shri.Kaushlendra Kumar		
Shri.SurendraVerma		

APPENDIX III - List of Workshop Participants

S.No.	Name	Designation/Office	E-mail	Mobile
1	Neha Samuel, Durg	Wildlife		9425544223
2	Shri Pranay Mishra	DFO Dharamjaigarh		7692079151
3	Shri S.S Kanwar	CF, Elephant Reserve, Sarguja		9479032508
4	Shri V. Ramarao	APCCF, Raipur		9425558546
5	Smt. Sanjeeta Gupta	CCF, Raipur		7999524300
6	Shri Vishwesh Kumar Jha	DFO Balodabazar		9425268895
7	Shri Rajendra Mishra	WTI		9424241900
8	Ms. Meetu Gupta	Conservation Core Society		9424140207
9	Shri V.S Rao	CEO- Campa		
10	Shri P.V Narsinga Rao	APCCF , HQ		9425252180
11	Shri Upendra Kumar Dubey	WWF - India		9907476613
12	Shri H.L Ratre	CCF,Bilaspur		9425507222
13	Shri Yunus Ali	APCCF (HRDiT)		9893200462
14	Shri AnupShrivastava	APCCF (Bamboo Mission)		9993030804
15	Shri AishwaryChandrakar	SDOP SitapurSarguja		9479193504
16	Shri VivekanandJha	DFO Balrapampur		7587301686
17	Shri Narendra Pandey	CF, Protection		9425261135
18	Shri S. Venkatachalam	DFO Korba		9425268680
19	Shri Abhay Kumar Shrivastava	CF, O/o PCCF, CG Raipur		7587070694
20	Shri R.K Rayast	DD, USTR		7693093324
21	Shri P.C. Pandey	APCCF (Protection)		9926153203
22	Shri Debashish Banerjee	CCF (W.P)		9425565143
23	Shri D.S Diwan	D.S.P Korba		9425522215
24	Shri P.K. Keshar	FD, ATR		7587012900
25	Shri Ankit Kumar	WII, Dehradun		9458509061
26	Shri Jayjit Das	WII, Dehradun		8100033696
27	Shri N. Lakshminarayan	WII, Dehradun		9445779042
28	Shri Anurag Srivastava	CF (CAMPA), AranyaBhawan		9424258701
29	Shri Vincent Rahim	CCF & FD Sanjay Tiger Reserve, Sidhi, MP		9424793668
30	Shri Prabhat Dubey	Forest Ambikapur		9826443763
31	Shri Pradeep Malik	Snr. Prof. WII		9412998113
32	Shri Parag Nigam	Scientist - WII		9412374486
33	Shri BivashPandav	Scientist - WII		9412057152

3rd Regional Workshop on "Right of Passage to Elephants" to mitigate Human-Elephant Conflict for East-Central Region-Workshop Proceedings

34	Shri KartickSatyanarayan	CEO- Wildlife SOS		9810114563
35	Shri R.B.P. Sinha	APCCF (W.P)		9425234749
36	Dr. A. ShaArun	Wildlife Veterinarian, Wildlife SOS		9980145785
37	Shri S.P Yadav	CCF, West Bengal		9903237100
38	Dr. Basavaraj SH	West Bengal		7407261851
39	Shri P.K. Sahoo	Odisha		9777083085
40	Shri Ajay A. Desai	Consultant, WWF		8880807325
41	Shri SubhashPuranik	ACF, Sawantwadi, MH		9422055146
42	Shri Sandeep Kr. Tiwari	WTI		9888274180
43	Shri M. Ananda Kumar	NCF		9443683514
44	Shri Aditya Gangadharan	IUCN		7400453023
45	Shri Bhakta PadarbindaRath	Odisha FD		9040207519
46	Shri I. Sengupta	S.T.S (MP)		8972845552
47	Shri VivekSaxena	Country Representative, IUCN		9999295320
48	Shri B.P. Singh	DFO Surajpur		9644565780
49	Shri Sudhir Agrawal	APCCF (A/G)		
50	Shri Hemant Kashyap	Jagdapur		9407616707
51	Shri SundeepBalaga	DFO Bilaspur	dfo-bsp@rediffmail.com	8919706470
52	Shri ShriKrishnaJadhav	DFO Jashpur	shri.ifs2014@gmail.com	7587015800
53	Shri M.K Pandey	DFO Raigarh		9868301946
54	Smt. Priyanka Pandey	DFO Surguja		7587015300
55	Shri A.K Biswas	CCF (Production)		9425833066
56	Shri U.K. Gupta	DFO Raipur		9424232091
57	Shri A.K Maheshwari	ADEN/11/R		9752877209
58	Shri A.B Minz	CCF Sarguja		9425254875
59	Shri F. Toppo	DFO Mungeli		8839771721
60	Shri Kumar Nishant	SDO Rajnandgaon		7906967368
61	Shri Pankaj K. Kamal	SDO W. Kapsi		7827815730
62	Shri J.S Chauhan	APCCF (WL) M.P.		9425303604
63	Shri R.P Singh	EX- APCCF & Wildlife Expert, M.P.		7354425776
64	Shri N.K. Vasu	PCCF & HOFF (Retd.), Assam		9588865429
65	Shri R.K Srivastava	Consultant, MOEFCC		9711419959
66	Shri Amalendu K. Mishra	Ambikapur	amalendu.mishra@gmail.com	9425266591
67	Shri Aminuddin	USTR	ccfwlrpr@gmail.com	9993893863
68	Shri Surendra Varma	ANCF	surendrav@alumni.cisc.ac.in	8065324304
69	Ms. Antara	Wildlife SOS	antara@wildlifesos.org	8334828885

3rd Regional Workshop on "Right of Passage to Elephants" to mitigate Human-Elephant Conflict for East-Central Region-Workshop Proceedings

	Chakrabarty			
70	Shri S. Swaminathan	Wildlife SOS	swaminathan@wildlifesos.org	7259039953
71	Smt Umadevi B.V	APCCF/CGVAPAM		
72	Dr. R.K. Singh	Ex-PCCF, CG.	ravi.ksingh.ifs@gmail.com	9813888083
73	Shri Kaushlendra Singh	Ex-PCCF(WL), CG	kaushlendrasinghccf1@yahoo.co.in	9425220158
74	Dr. S.K. Singh	APCCF (Production)	skhisk@yahoo.com	9425203495
75	Dr. Rajeev K. Srivastava	Ex-PCCF Tamilnadu	srivastavaraj3@yahoo.com	7338853888
76	Shri M.S. Negi	ADG Wildlife, MOEFCC	adgwl-mef@nic.in	8860505024
77	Shri S.I. Manoj Navrange	Asst. Balraipur	kumarmanoj310584@gmail.com	9424280218
78	Dr. K.M. Selvan			8610032757
79	Miss Sailaja Nayak	SRF, Aranya Bhavan	nayak.sailaja@gmail.com	7727988298
80	Mr. Naveen M	SRF, Aranya Bhavan	naveenwildlife@gmail.com	9009879523
81	Mr. Ashish Kambale	SRF, Aranya Bhavan	akhornbill@gmail.com	9575062133