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HUMAN WILDLIFE CONFLICTS: CAUSES AND MITIGATION MEASURES IN WAYANAD WILDLIFE SANCTUARY OF KRALA

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ABSTRACT

Human-Wildlife Conflict (HWC) happens when wildlife requisites encroach on human populations, which costs; both to residents and wild animals. Lack of resources is the vital reason for conflicts and it causes crop damage, cattle-lifting, human casualties and household damage. Wild animal- human conflict incidents are likely to increase and threaten the domestic animals. Especially cattle, goats, and poultry of poor villagers, occurring in and around national parks and wildlife sanctuaries. Human population expansion, habitat degradation and fragmentation, land use transformation and rising densities of livestock in protected areas are considered as the major causes of Human-Wildlife conflict. In this context a study was carried out with the objectives to assess and estimate the human causalities, crop damage, cattle lifting, by wild animals and how to reduce the conflict with suitable mitigation strategies. The data regarding human casualties and injuries, house damage, crop damage and cattle loss caused during wildlife conflicts from 2015 to 2020 was collected from Wayanad wildlife sanctuary and analysed.

Key Words: Human-Wildlife Conflict, Kinds of conflicts, Consequence and Coexistence, Wayanad wildlife sanctuary, Mitigation measures.

Introduction

Human-Wildlife Conflict (HWC) is a challenging concern everywhere in the world and the problem is getting worst due to the uncontrolled behavioural patterns of both human beings and wildlife. HWC is of grave concern for all those who are involved in conservation and also to the people who stay in the fringe areas of the forests. It happens when the needs

and behaviour of wildlife impact negatively on the goals of the human beings (Cumming *et al*., 2005). HWC is negatively influenced by both human beings as well as wild animals and also affect adversely their resources or their habitat. The negative interactions may result in (a) crop damage by wild animals (b) cattle-lifting, (c) human casualties and (d) household damage (Conover, 2002). HWC happens when growing human populations overlap with established wildlife territories, increasing interrelation of man and wild animals and thus resulting in increased levels of conflict. Direct contact with wildlife occurs in both urban and rural areas, but it is generally more common inside and around protected areas (Distefano, 2004).

Wayanad is a north-eastern district of Kerala spread over 2132 sq. km in area with forests and human settlements. It's sharing all border with Karnataka's Nagarhole national park and Tamil Nadu's Muthumalai national park. It comes under the administrative control of North Wayanad, South Wayanad and Wayanad wildlife forest divisions and constitute a major portion of Nilgiri Biosphere Reserve. Wayanad Wildlife Sanctuary 344.44 km^2 is consisting of four ranges namely Sulthan Bathery, Muthanga, Kurichiat and Tholpetty. The major carnivorous predators of the Wayanad Wildlife Sanctuary are Leoperd (*Panthera pardus*), Tiger (*Panthera tigiris*), and wild dog (*Cuon alpines*). Predators raiding nearby villages and fringes area of the forest, causes killing of livestock such as cattle, goats, poultry, dogs or even human beings which become a matter of serious concern with HWC. In order to alleviate such HWC around the study area, we have included preventive measures and mitigation strategies to be recommended for the coexistence of human and wildlife.

Human habitations and cultivation

There are 57 enclaves having 107 settlements with 10,604 people living in 2,613 families in an area of 4.96 km^2. The native tribes mainly consist of Paniya, Kuruma, Adiyar, Kurichya, Oorali and Kattunaikkan tribes. The major challenge is protection and managing human pressure on the habitat. HWC is also a challenge given the high densities of wildlife and people living in close proximity to each other (Anon, 2012).

These settlements are confined to the moist deciduous forests and teak plantations. The people inhabit almost all the fields with perennial water sources. A population of more than 25,000 people live in and around the protected area. The main occupation of the people in this area is agriculture. They cultivate cash crops such as coffee, pepper and coconut followed by primary crops *viz.*, paddy, ginger, tapioca and plantains. Cattles and goats constitute the livestock. The people residing inside the sanctuary owns a total of 3500 cattles. These animals are mostly left to feed inside the Sanctuary.

Vegetation Types

The forest types in the area are mostly, moist deciduous (MDF) with a few scattered patches of evergreen and riverine forests. A long belt of dry deciduous forests (DDF) exists in the areas bordering Tamil Nadu and Karnataka. One third of the sanctuary is covered by teak plantations, eucalypts and mixed species interspersed with bamboo. The forest types could be broadly classified into the following categories (Champion and Seth, 1968).

a. Southern Moist Mixed Deciduous Forests, b. West Coast Semi-Evergreen Forests,

c. Southern Dry Mixed Deciduous Forests

Fauna

The area is rich in faunae in diversity and abundance. Almost all the large mammals of peninsular India are observed in the area. The area has a good population of elephant (*Elephas maximus*), gaur (*Bos gaurus*), sambar (*Cervus unicolor*), spotted deer (*Axis axis*), barking deer (*Muntiacus muntjac*), mouse deer (*Tragulus meminna*) and wild boar (*Sus scrofa).* Other animals such as bonnet macaque (*Macaca radiata*), common langur (*Presbytis entellus*), sloth bear (*Melursus ursinus*), tiger (*Panthera tigris*), wild dog (*Cuon alpinus*), panther (*Panthera pardus*), jungle cat (*Felis chaus*), Indian pangolin (*Manis crassicaudata*), porcupine (*Hystrix indica*), Malabar giant squirrel (*Ratufa indica*), and Indian hare (*Lepus nigricollis nigricollis*) are also seen in this area. Sighting of four horned antelope (*Tetracerus quadricornis*) is rare and are restricted to areas bordering Karnataka. A total of 44 species of reptiles (Thomas, *et al*. 1997), 31 species of amphibians (Easa, 1998) and 54 species of fishes (Easa and Shaji 1997) were identified from Wayanad.

Kinds of Human-Wildlife conflicts

The incidents of Human-Wildlife Conflicts can be categorised into following major types:

i. Human beings get killed or bruised by wild animals in HWC.

ii. Livestock/Cattle reared by man get killed or bruised in HWC.

iii. Crop cultivation is damaged by wild animal in HWC.

iv. Wild animals get killed or bruised in HWC.

Causes of Human-Wildlife Conflicts

1. Habitat fragmentation and shrinking of habitat giving rise to shrinking of space, food etc. in the forest resulting, in animals straying out of habitat in search of food, water or shelter.

2. Invasion of the forest lands by local people has resulting in shrinkage of wildlife habitats especially on the peripheries which increases pressure on the limited natural resources of the forest areas.

3. Increased disturbance due to collection of fuel wood, fodder, water etc. from the forests also increases the occurrences of HWC.

4. Increase in the area under agriculture around wildlife habitats and changes in cropping pattern also contributes to increased HWC. People have started cultivating commercial crops like banana, which attracts the wild animals like wild boar, sloth bear and panther.

5. Every year the local people have to go deeper and deeper, for collecting firewood and other forest products for their use, because of deterioration of forests fringes. This activity results in the increased number of incidences of HWC.

6. Invasion of wildlife habitat by exotic weeds like Lantana, Eupatorium and Parthenium which results in decreased availability of edible grasses for the wild herbivores. As a result, herbivores come out of forest area and cause despoliation of agricultural crops on the fringes.

7. HWC increases during summer when water becomes scarce. The livestock and wild animals have to share the limited water sources on the fringes or inside forest. Human involvement with the natural drainage system in forest areas and diversion of water towards habitation have further escalated the issue.

8. In some forest areas, the number of wild animals especially prolific breeders like wild pig increased beyond the carrying capacity of the habitat. Hence these wild animals stray out of forests which triggers HWC.

9. Diminishing prey base trigger by poaching of herbivores results in carnivores moving out of forest in search of food and indulge in cattle lifting.

Consequences of Human-Wildlife Conflicts in Conservation Process

Increasing global population, coupled with greater resource claims, have resulted in substantial limitations for conservation and development goals on the fringes of protected areas. Many times, wild animals have been shot, burnt alive, killed or poisoning by agitated mobs. Livestock lifting leads to direct tussle with villagers and strong backlash with forest department. HWC is the main reasons for the radical reduction in the number of charismatic and flagship species. Illegal victimisation of predators, including poisoning, shooting and trapping, is still one of the greatest threats to wildlife. HWC is the main threat to the conservation of most endangered species and has a broader environmental influence on the ecosystem equilibrium and biodiversity preservation. HWC, rural poverty and hunger, the exorbitant costs of wildlife law enforcement arising from land use practices; have all severely limited wildlife conservation outside confined areas.

Materials And Methods

The intensive study areas were confined to the four forest ranges namely; Sulthan Bathery, Muthanga, Kurichiat and Tholpetty of Wayanad district of Kerala for a period of five years from 2015 to 2020. The study was initiated to asses Human-Wildlife conflict and it causes. Case studies were carried out on livestock lifting, crop damage, house damage, human injury and death by wild animals. Compensation disbursed during the period were quantified.

Recommending mitigation measures to prevent or control Human-Wildlife conflicts and coexistence.

Results and Discussion

A total of 9 human deaths and 41 cases of human injuries were reported in the four forest ranges of Wayanad Wildlife Sanctuary limits by the attack of wild animals. Ex-gratia for livestock lifting determined by Veterinary surgeon's report and total number of cattle losses during the study period was 384. The incidence of livestock death occurred while the animals were grazing in or around the forest areas, particularly tea or coffee estates which are situated on the fringes of forest. 41 cases of house damage and 3626 incidence of crop damage were reported during the study period. Kerala Forest and Wildlife Department disbursed 42,034,000 rupees for compensation on 465 applications claimed by farmers during the year 2015-2020. HWC has been noticeably reduced during the period 2017-2018 and 2019-2020 in the Wayanad Wildlife Sanctuary (WWS) as per the WWS records. In 2017-2018, Rs 73.13 lakh was disbursed as compensation for 800 applications whereas in 2019-2020 the total number of applications received was only 642 and the total amount of compensation disbursed was only Rs 68.50 lakh. The crop damage cases also diminished from 689 in 2017-2018 to 555 in 2019-2020.

Table.1. HWC In Wayanad Wildlife Sanctuary limits

Year	Human injury	Death	House damage	Crop Damage	Cattle loss	Application (for compensation)	Amount in lakh
2015-16	08	00	07	871	78	965	76.42
2016-17	08	03	04	826	74	917	83.35
2017-18	11	02	13	689	80	800	73.13
2018-19	06	03	05	1185	108	1328	118.94
2019-20	08	01	12	555	44	642	68.50

Source: WWS data

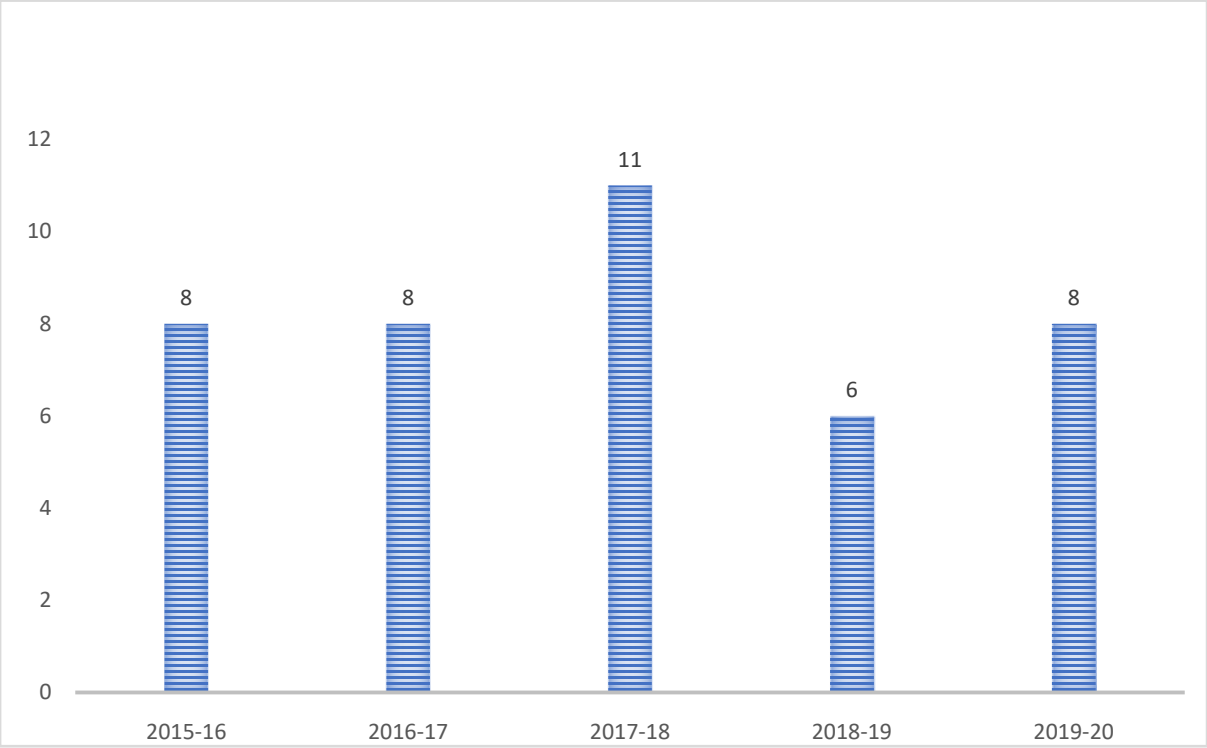

Fig.1. Injury caused by the attack of wild animals during the period 2015-2020

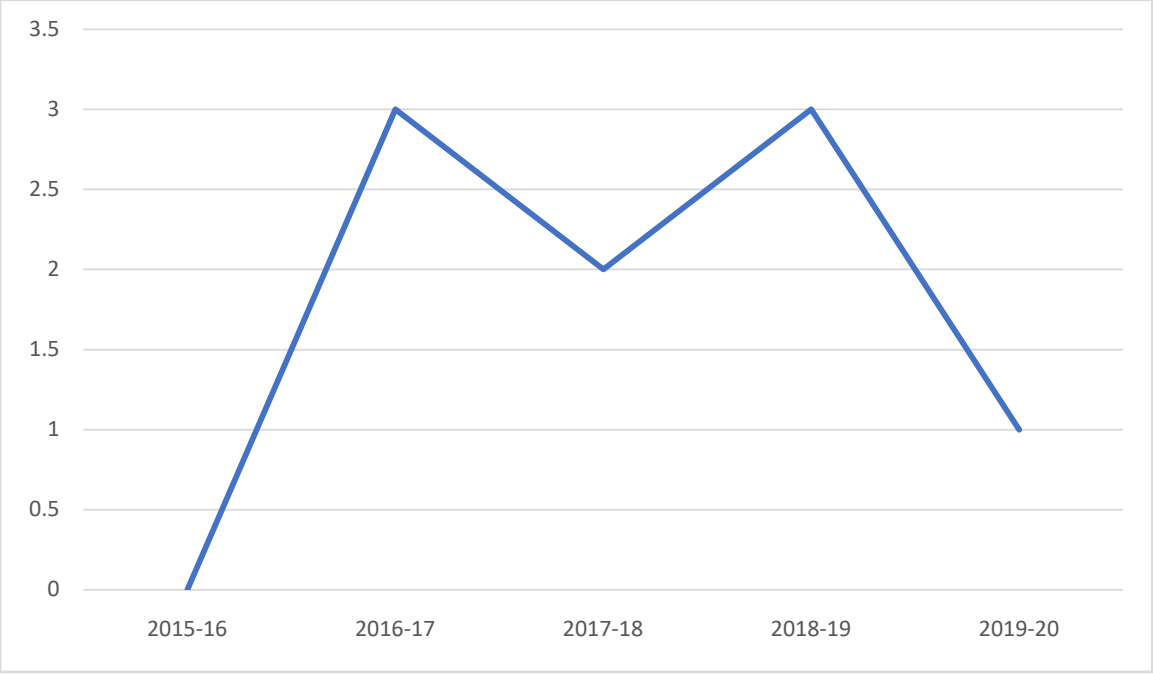

Fig. 2. Human death caused by the attack of wild animals during the period 2015-2020

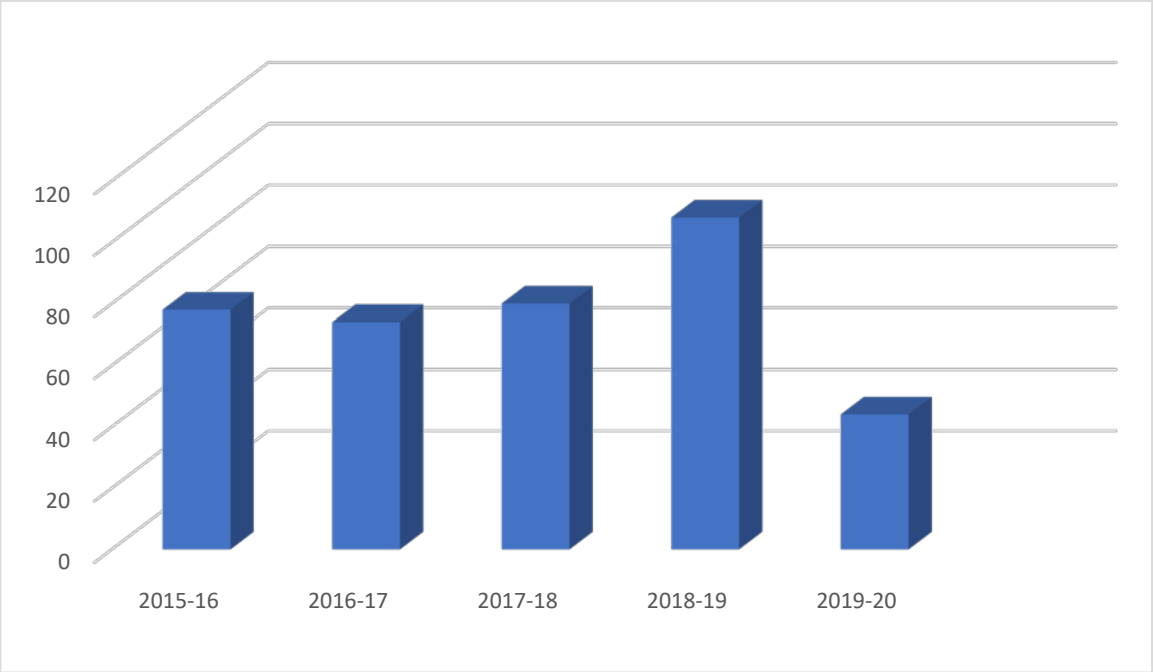

Fig. 3. Cattle loss caused by the attack of wild animals during the period 2015-2020

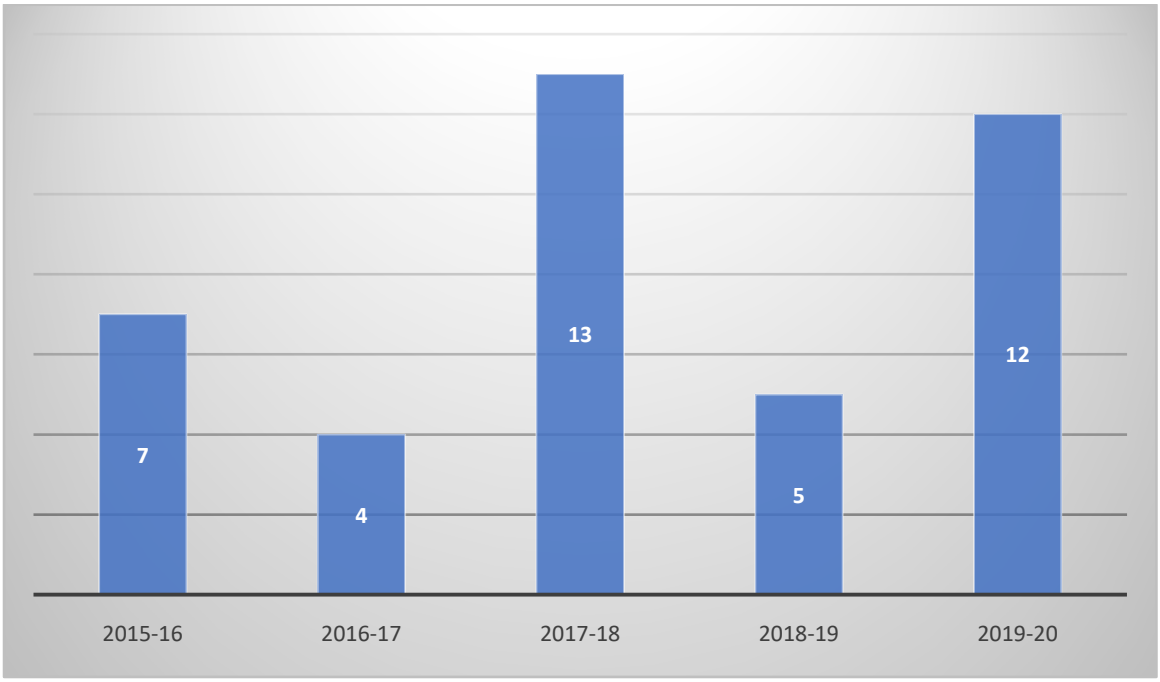

Fig. 4**.** House damage due to the attack of wild animals during the period 2015-2020

Mitigation measures of Human-Wildlife Conflict

Human-wildlife interactions leading to conflict often may be controlled by variety of management strategies. The strategies mainly deal with wildlife management, the stake holders, land management, and livestock management. HWC can be reduced to minimum and can be controlled if some of the following precautions are taken and measures adopted sincerely.

Curb poaching: Poaching of wild animals should be bunged so that, the number of wild animals can reach it carrying capacity which tend towards equilibrium in the ecosystem so that equilibrium between the prey and predators in the forest ecosystem would be retained.

Commence Soil and Moisture Conservation Measures (SMC) works in the habitat: To stop soil erosion and to increase water availability in the forests, SMC like vegetative checks dams, loose boulder check-dams, cement plugs and water tanks, could be carried out in the forest so that water regime of the forest is boosted in a natural way which will improve the productivity of the forests as well as water accessibility in the habitat. Then the adequate food and water for wild life available and will reduce the number of animals straying out of forest.

Cease monoculture and increase number of edibles miscellaneous species: The practice of planting monoculture species like teak, should be curtailed and we should introduce mixed plantations of bamboo and fruit species which will deliver more food for the animals in the forest. Mixed plantations also provide hiding shelter to animals as well as food for most herbivores.

Prevent fragmentation of wildlife habitat and wildlife corridors: Where constructing dams, long canals for irrigation and highways through the forest areas, we should elude the fragmentation of wildlife habitat and take appropriate care so that the connectivity through wildlife corridors is not disrupted. Animals cannot pass across these canals and roads easily and they are confined and their natural balance is disturbed. There should be over pass and under passes for free wild animal movement so as to reduce the accidental death drastically.

Supply Liquid Petroleum Gas (LPG) to villagers: LPG should be supplied to those villagers who repeatedly encroach the forest areas, especially wildlife habitats to fetch fuel wood so that they may stop infiltrating into forest and stop inducing Man-Animal Conflicts. These people are most susceptible to HWC.

Awareness Raising: People should be made aware more through meetings and print outs etc. to avoid driving deep into the forest areas. If they have to move in at any case they should move in groups and they should keep talking to each other to detract the wild animals. School children in susceptible villages should be taught about the significance of wildlife and human co-existence with it.

Ordinary Fencing and Guarding: The fields should be enclosed by using distinct materials like rail fence, bamboo, barbed wires, thorns, hedgerows etc. This kind of protection along with guarding at night by local people from machans (platforms on trees) or guard sheds on ground with fire and sound producing devices like tins, drums, etc. can reduce HWC considerably.

Special Protection: This is similar to the conventional fencing but used along with various elephant scaring devices in most of the places, trip wires with explosive crackers are used as special protection devices.

Solar Fencing nearby agriculture fields: Agriculture fields can be protected by stone wall or solar fencing which is situated near wildlife habitat/forest areas.

Avoid planting fruit plants near forests: This activity will reduce man-animal conflicts in adjacent human populated areas of forests. An alternative is to plant some fruit trees in the natural habitat of black bears as it will limit their traffic towards human habitations.

Timely paying of Ex-gratia/Compensation to the people: Ex-gratia /compensation should be disbursed promptly and timely to the victims of wildlife attack, so that the people should not develop animosity attitude to the wild animals. Otherwise, people tend to take revenge against from the wild animals by killing them by poisoning, trap, hacking or shooting as it has been observed in various cases.

Habitat Restoration: As a result of growing human population, switching land use practices and subsequent anthropogenic pressures, forest cover has either declined or deteriorated due to habitat degradation. Evading deforestation and planting new trees in forest areas can revive the habitats, lowering conflict rate in the long run.

Beehive fence: Most of the elephant attack occurred at night, the guarding bees were active even at night in the presence of elephants. Honey bees buzzing sounds itself held the elephant away from the honey bee fence. With the prior experience of honey bee strikes from the forest they tend to move away from the honey bee fence.

Trench: Trenches are dug around the border of the settlements by the Forest Department. In the case of elephant, it was noticed that trenches were useful to thwart or control crop raiding.

Yellow coloured cloth: Yellow coloured cloth is a valuable mitigation strategy to foil the crop raiding animals like wild pig and Indian crested porcupine. The bright coloured cloth was easily sensed by the crop raiding animals even during the dark hours and they eluded such areas and this method was effective and practiced by the farmers.

Relocation/Rehabilitation of problematic and disadvantaged wild animal: Wild animals like tiger, panther, or bear which has become disadvantaged or problematic, should be detained either by tranquilization or safely by trapping cages. Then it should be relocated to appropriate habitat or be kept in a zoo or rescue centers for its remaining life.

Crop Insurance: A crop insurance plan in response to the perils of wildlife depredation would cushion the shock of crop losses, thereby offering farmers with a minimum amount of protection.

Resettlement: The scattered settlements within the forest are obstacles to the free movement of wildlife. Adequate measures should be taken for resettling the inner enclosures thereby consolidating areas ensuring free traffic of wildlife.

Law enforcement: Appropriate legal actions should be imposed in order to protect natural habitats against illegitimate exploitation and to avoid human interventions in such areas.

Eco-development programmes: Eco-development programmes for alternate source of income instead of depending on the forest should be taken up that would lower their impact on the habitat to a great extent.

Conclusion

The co-existence with wildlife is expensive for local communities; loss of cattle, crop damages or even fatalities to the people. Evaluating the importance of their losses, it appears significant to emphasize mitigation measures, create more income-generating activities from forest and generate a dynamic compensation plan in order to relieve local communities. The Government should avert diversion of forest land, habitat and its corridors for any other purpose. Encroachments in the habitat or in its fringes are to be eliminated and to be hindered. Authorities should not allow people going alone and going deep into the forests. The formation of mobile rescue teams, training of wildlife staff in handling, tranquilizing and transportation of wild animals are to be ensured. Awareness raising have to be carried out so that people resume their habit and follow co-existence with wildlife in this region, which will go a long way in protection and conservation of wildlife and in mitigation of HWC. The soundest tactic in addressing HWC is to execute a combination of short-term mitigation tools alongside long-term preventive measures.

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