

Human-Animal conflict issues in the Gudalur Reserve Forest Division of the Nilgiris, Tamil Nadu, Southern India - A case study

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Abstract

Issues of human animal conflicts in the fragmented landscape of Gudalur reserve forest division of the Nilgiri was analysed in 2006. Data on human animal conflicts were collected through questionnaire survey from the villages and ten years secondary data on conflict issues were collected from the records of the forest department. Among the wild fauna Asian elephant (*Elephas maximus*) has been found as the most potent agent in the study area. On an average of two people and one elephant had been the victim due to conflict every year. On the other hand larger carnivores living in this landscape mostly depending on the domestic livestock due to lack of their prey. The result showed that Leopards were involved 87% (average of 60 to 70 livestock/annum) of livestock liftings. Observations made in this division clearly indicates that fragmentation of habitat is the main cause for the conflict issues. Conversion of natural habitat in to tea estates and encroachments led to habitat fragmentation and the animals get isolated which ultimately resulted for various human-animal conflicts in the Gudalur reserve forest division.

Key words : Conflicts, Asian elephant, Leopard, Habitat fragmentation, Gudalur forest division

INTRODUCTION

Human-Animal Conflict (HAC) is the universal problem when villages are located close to forest areas and the problems are inevitable. In the processes of conflicts victims are usually on both sides that is either human beings get killed by wild animals or Wild animals killed and vice versa. This process is going on for several decades in most of the human dominated forest landscapes. Major reasons for the conflicts are habitat fragmentation, habitat degradation and habitat loss. The animals such as Elephant (*Elephas maximus*), Tiger (*Panthera tigris*), Leopard (*Panthera pardus*), Sloth bear (*Melursus ursinus*) and to some extent Dhole or wild dogs (*Cuon alpinus*) are involving conflicts with settlements and villages, and these animals are considered as schedule I species under Indian Wildlife (Protection Act 1972). Among the species listed elephants and leopards are the most common species involved in conflicts, and it could be attributed to the fact that the elephants are the long ranging species that requires large area for foraging (Sukumar, 1989; Baskaran, 1998). On the other hand leopards are common species found in all the habitats (Kitchener, 1991), also live outside the forest areas (Prater, 1971). The developmental activities such as highways, railway tracks, dams, new villages and conversion of forest into commercial plantation like tea and coffee and agricultural crops cultivation resulted both in habitat loss and habitat fragmentation.

Gudalur forest division is popularly known as the Nilgiri-Wynaad Plateau (Davidar, 1972) which lies to

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the west of the Nilgiri hills and forms the south-western extremity of the Mysore plateau. During 1950-1990 there had been rapid changes in the ecology and environment on the Nilgiri-Wynaad Plateau. The greater polarization between the forces of conservation and development brought different human groups into flash-point conflicts over access to resources, which triggered rapid changes, where events occurring outside the realm of normal processes within the Nilgiri-Wynaad Plateau (Prabhakar, 1994). These events increased on the migration of human groups into the area, and quickened the pace of commercialization and they also heightened conflicts land access among the various contending interests to indigenous groups, the estates and immigrants in the Nilgiri district. During that time conservation ethic also had its impacts in portions of the Nilgiri-Wynaad Plateau, and the northern portions were declared as the Mudumalai Wildlife Sanctuary which is contiguous to Bandipur National Park and Nagarhole National Park. This contiguous stretch was the habitat for large mammals that were abundant in these deciduous tracts (Davidar, 1972; Prabhakar, 1994). With high protection, wildlife increasingly came into conflicts with the inhabitants in the periphery of the sanctuary due to crop damage by elephants and livestock kills by the predators.

The Nilgiri- Wynaad was an area that had sufficient forested lands and the state could establish control by abolishing the traditional *Janmam* rights, and the state also wanted to counter and halt the large scale migrations of human groups from Kerala state. In 1971 The Tamil Nadu state set up a corporation called the

TAN TEA (Tamilnadu Tea Plantation Corporation Limited) under the forest department and opened out tea estates in the contiguous forest areas to provide employment opportunity to the Sri Lankan repatriates. The plantation area was increased to 5,790 ha, and the Sri Lankan repatriates were settled along with their families and relatives in the Nilgiri-Wynad Plateau in the latter half of 1981.

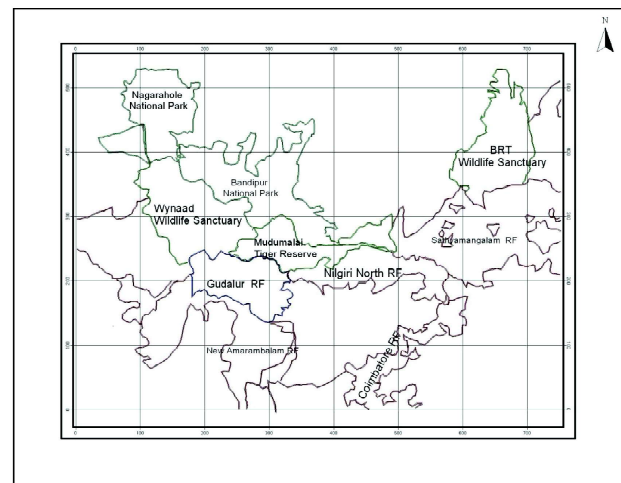
Davidar (1972) stated that this forest division had sizeable elephant population during migration between the Mudumalai Wildlife Sanctuary and Silent Valley National Park through Nilambur and New Amarambalam reserve forest tracts of Kerala. The man made activities such as hunting and mining operations were extensively recorded during nineteenth century. Hunting was prohibited after the successful implementation of Indian Wildlife (Protection) Act, 1972 in the country. Mines were abandoned when they failed but other development activities such as coffee, tea and forest plantations continued. Once there was contiguous forest cover of the Gudalur plateau acted as a linkage between the forests of Kerala, Tamil Nadu and Karnataka, facilitated the movement of wild animals, especially migration of elephants and to some extent of gaur. Rapid and excessive development of plantations has resulted in the formation of forest patches which triggered the animals to go outside the forest areas in search of food created conflict situation in this division. With this background the present study was carried out in the Nilgiri-Wynad Plateau to assess the status of Human-Animal Conflicts and to assess the species involved and compensation paid.

MATERIALS AND METHODS

The Gudalur division, situated at the convergence of Kerala, Karnataka and Tamil Nadu, lies between 11°22' and 11°34' N and 76°32' and 76°15' E covering an area of 484.4 sq.km. This forest division is surrounded by Sigur Plateau on the east, Nilambur-Wynad on the west, Mudumalai-Wynad on the north and Nilambur forest on the south (Map 1). The tropical wet evergreen and moist deciduous are the major forest types of Gudalur division which form part of the Nilgiri Biosphere Reserve. The other forest types represented are semi-evergreen and South Indian moist mixed deciduous forests on the western side thinning into heavy scrub of the dry deciduous forests on the east. Bamboo and elephant grass grow luxuriantly and support a large variety of herbivores. The important mammalian species found in this area are Asian elephant (*Elephas maximus*), Gaur or Indian Bison (*Bos gaurus*), Sambar deer (*Cervus unicolor*), Barking Deer (*Muntiacus muntjak*), and arboreal animals such as Common Langur (*Semnopithecus entellu*), Bonnet Macaque (*Macaca radiata*), Indian Giant Squirrel (*Ratufa*

indica), etc. The important mammalian carnivores found in this division are Tiger (*Panthera tigris*), Leopard (*Panthera pardus*), Jungle Cat (*Felis chaus*), Dhole or Wild dog (*Cuon alpinus*), Golden Jackal (*Canis aureus*), and Sloth bear (*Melursus ursinus*) and smaller carnivores such as palm civet (*Paradoxurus hermaphrodites*), small Indian civet (*Viverricula indica*), Grey Mongoose (*Herpestes edwardsi*), Stripe-necked Mongoose (*Herpestes vitticollis*) are commonly seen here. Data were collected in the field and villages by questionnaire survey and forest department records from 1996 to 2006 was collected on number of conflict incidents, forest range, species involved and details of compensation paid, etc. Survey on the socio economic status was collected in each village across the forest division.

Map 1. Location of Gudalur Forest Division in the Nilgiris and Eastern Ghats Landscape



Land use

During the 19th century the successors of the Nilambur Kovilagam (Janmies) started leasing out their lands (Janmom) to plantation companies in order to cater to the revenue demands of the colonial state. During 1969, the Tamil Nadu government passed the Janmom Lands (Abolition and Conversion into Ryotwari) Act. But the Act was subjected to litigation and it was not notified until 1974. The major plantation companies filed a case in the High Court of Madras and argued that their lands should be considered under Section 9 of the Act and they should be deemed tenants of the Janmies and given title deeds. The High Court dismissed their petitions. During 1977, the apex court proceedings stated that the plantations companies would not expand the area under cultivation within their lands. Further surveys however revealed that the planters flouted this undertaking. During 1969, the Tamil Nadu Tea Plantation Corporation (TANTEA) moved into the area in a bigger way and cleared the tropical evergreen and grassland areas and planted tea to settle repatriates from Sri Lanka. Other severe man made damage hampered

the vegetation was encroachments. Migrants who moved into Gudalur in the 1950s and early 1960s from Kerala have had land deeds. These activities resulted in vast forest habitat became fragmented and made into small patches of forests that lead to isolation of elephant population with loss of forest connectivity.

RESULTS

Table 1. Human casualties caused by elephants from 1971 to 2005 in the Gudalur Reserve Forest Division

Name of the Forest Ranges	Human deaths caused by elephants (n= 32)		Injury caused by elephants to human (n=7)	
	Male	Female	Male	Female
Cherambadi	3	0	1	1
Gudalur	13	3	4	1
Bidharkadu	3	0	0	0
Pandalur	6	0	0	0
Adjoining Gudalur (Mudumalai WLS)	4	0	0	0

Injury and deaths caused by elephants for the past three decades data was collected from the records of the forest department. The result revealed that more incidences were recorded in the Gudalur Forest range (n=21) followed by Pandalur (n=6) and Cherambadi (n=5) forest ranges (Table 1).

Table 2. Elephant deaths recorded from 1993 to 2006 in the Gudalur Reserve Forest Division

Name of the Forest Ranges	Number of Elephant deaths (n=34)		
	Male	Female	UN
Cherambadi	2	2	0
Bidharakadu	2	2	0
Gudalur	6	11	7
Pandalur	1	0	1

As like human deaths, more number of elephant deaths were also recorded in the Gudalur Forest Range (n=24) followed by Cherambadi (n=4) and Bitherkad (n=4) forest ranges. Only one incidence was recorded in the Pandalur (n=1) Forest Range between 1993 and 2006 (Table 2).

Table 3. Crop damage caused by elephants in the Gudalur Reserve Forest Division

Name of the forest ranges	Total number of incidences/year	Damage period	Damage status	Compensation claimed	Demography of elephants reasoned for crop damage	Crops under cultivation
Cherambadi	251	February-September	Medium	Nil	Family herds, tusker and tuskless males	Tea, Plantain, Areca nut, Coconut, Coffee, Jack fruit, Mango and pepper
Pandalur	102	-do-	Low	Nil	-do-	Tea, Plantain, Areca nut, Coconut, Coffee, Jack fruit, Tapioca, Rubber, Paddy and pepper
Gudalur	1065	-do-	High	One person partially claimed at Nelliakarai	-do-	Tea, Plantain, Areca nut, Coconut, Coffee, Jack fruit, Mango and pepper
Bitherkad	825	-do-	High	Nil	-do-	Tea, Plantain, Areca nut, Coconut, Coffee, Jack fruit, Mango, Paddy, Ginger, Tapioca, Cardamom, and pepper

Among the forest ranges the Gudalur Forest Range attributed highest crop damage incidences caused by elephants in the Gudalur Forest Division (1065 incidences/year) which was followed by Bidharkadu (825 incidences/year) and Cherambadi (251 incidences/

year) Forest Ranges. Damages were occurred mostly during dry season (Feb-May) and 1st wet season (June-Sep) (Table 3). Except one person at Nelliakarai belonged to Gudalur Forest Range none of them were not claimed for compensation.

Table 4. Properties damaged by elephants in the Gudalur Reserve Forest Division between 1996 and 2006

Name of the Forest Ranges	Various assets damaged by elephants (n=85)				
	House (Estate Labour Quarters)	Leaf Shed	Motor Shed	Fence	Electric Post
Cherambadi	19	0	1	1	0
Gudalur	34	0	0	0	1
Bidharkadu	6	0	0	0	0
Pandalur	18	5	0	0	0

Among the assets damage caused by elephants, the labour quarters was most affected one than others. Out of seventy seven labour quarters damages, thirty four house damage incidences were recorded in the Gudalur forest range alone followed by Cherambadi (n=19), Pandalur (n=18) and Bitharkadu (n=6) forest ranges. On the contrary, the leaf sheds were highly damaged in Pandalur forest range (n=5). Other assets such as motor shed, fence and electric posts damaged by elephants was very few (Table 4).

Table 5. Various causes of animal deaths and status of the wildlife cases recorded from 1993 to 2006 in the Gudalur Reserve Forest Division

Name of the wild animal species	Cause of deaths						Status of registered cases as per the record
	Natural	Electrocution	Gun Shot	Road Kill	Country Balm	UN	
Elephant	8	3	2	0	3	18	Sent to Court - 22
Tiger	0	0	1	0	0	3	others -12
Leopard	0	0	0	1	0	0	

Among the wild animals the elephant was mostly affected species than others. Totally thirty four elephants, three tigers and one leopard were died between 1993 and 2006 in the Gudalur reserve forest division. The Un Identified seemed to be cause of deaths for most of the animals irrespective of the species (n=21) which was followed by natural (n=8). It was unfortunate to highlight here Gunshot and Country Balm blast reasoned for the cause of deaths for endangered species like elephant (n=6) and tiger (n=1) (Table 5.).

Leopard was considered as most threatened wild animal species reasoned for livestock lifting's (n=612) followed by tiger (n=24) and wild dog (n=10). It was unfortunate to record here that Un Identified wild animals for lifting livestock was n=60 (Table 6).

Table 6. Livestock lifted by carnivore species recorded between 2000 and 2006 in the Gudalur Reserve Forest Division.

S.No.	Name of the Carnivores lifted livestock	Total number of incidences
1	Leopard	612
2	Tiger	24
3	Wild Dog	10
4	Unidentified (UN)	60

DISCUSSION

The human-animal conflict is the universal problem where human settlements are proximity to forest area and this problem is inevitable. Nevertheless there is no clear policy to address this issue. Moreover ineffectiveness of some of the management practices is directly dependent on the establishment and application of policies and guidelines on a wide range of human activities. Once the habitat is fragmented or reduced in size, animals which are living in that area become isolated and hemmed in small patches of forest surrounded by vast area of agriculture crops, tea estates and settlements. The present study indicates that villagers in Gudalur forest division experienced human victims due to elephants, crop and assets loss and substantial livestock depredation by carnivores. Being a wide ranging behavior of elephants require large area to forage, the present study revealed that the Gudalur forest division is completely fragmented into tea estates, agriculture lands and human settlements which led to sever human elephant conflicts in the division. Human killing by elephants is the outcome of the elephant's incursion into the crop lands and most of the incidents occur within human settlements. Many of them were also accidental killings of people who get in the way unknowingly. In the present study it was found that thirty four victims of people killed by elephants in the division over the past ten years.

Besides elephant conflicts, considerable incidences of livestock lifting by carnivores were also recorded. Among the carnivore conflicts, depredations of livestock by leopard were high followed by tiger and dhole. There were sixty unidentified incidences of livestock death reported. However, the cause of incidents could not be confirmed due to misidentification of carnivores by the local people during the night hours. The evidences and recorded incidents of Dhole visits to human habitations were low, unlike Northeast India where dhole was the major predator which mainly prey upon *mithun* (*Bos gaurus frontalis*) as reported by Aiyadurai *et al.*, (2004) and Babu and Venkataraman (2001). The high incidents of livestock depredation especially by leopard is not new, when density of wild prey is depleted in the wild, carnivores have to dependent on domestic prey as

alternative (Sathyakumar, 1992). Arivazhagan (1998) stated that livestock was the major component of the leopard's diet in the Nilgiri Eastern Slope Range of the Nilgiri North Forest Division where the densities of domestic ungulates were higher than those of wild ungulates found inside the forest (Seidensticker *et al.*, 1990). Edfaonikar and Chellam (1998) found domestic dogs, domestic buffalos and rodents were the major prey for leopard in Sanjay Gandhi National Park. The present study suggests that too many villages in and around the reserve forest and fragmentation to habitat due to expansion of tea estates and agriculture lands, which made the habitat fragmentation into small patches of forest which led to the human animal conflicts in the division. This present study concludes that the carnivores disturbed behavior in the Gudalur forest division due to its fragmentation.

The assessment of damages caused by elephants in the Gudalur forest division revealed that the estate labour quarters were extensively damaged by elephants than other man made constructions. Studies suggested that the elephants used the microhabitats during the dry season when deciduous forests become unpalatable (Sukumar, 1989; Sivaganesan, 1991; Rameshkumar, 1994; Baskaran, 1998). The swamps have been extensively used by elephants during the dry season to meet out their food and water requirements. This present study found that the labour quarters have been constructed in the swamp areas that had been undisturbed in the past. But the swamp areas are now converted into labour quarters where tea and coffee do not grow. Another reason could be the elephant preferable food plants such as plantain, jack and mangoes are planted by the labours in their premises which are attracting elephants come towards houses and damaged the quarters when they get disturbed by the people.

Among the forest ranges Gudalur range faced more man animal conflict problem than any other forest ranges, which could be due to the fact that Gudalur forest range is located adjacent to the protected area of Mudumalai Tiger Reserve (MTR). The probability animals migrate from MTR to Nilambur reserve forest division through Gudalur forest range is more, where extensive agriculture and settlements are relatively more reasoned for the high incidences of conflicts. Another reason is that the loss of corridors between dry deciduous forests (Mudumalai WLS) and evergreen forests (Silent Valley NP) could be the major factor for the heavy crop damage incidences in this forest division. In the Gudalur and Bidharkadu forest ranges crop damages caused by elephants every year. In Cherambadi forest range apart from agricultural crops, labour quarters were extensively visited by elephants to eat preferable species such as plantain, jack and mango. Both female herds and loners

including *Makhnas* (tuskless male) raided the crops considerably across the division.

Human activities such as cattle grazing, wood cutting and encroachment into forest habitat for agriculture have contributed for the conflict in the division. In the present study it was found that among the incidents of human killings by elephants male victims were higher than the female, and the reason could be the fact that men are entering in to the forest more frequently for fuel wood collection during the day time, consumption liquor and reaching home during late night. In the case of female most of them are engaged in the tea and coffee estate as labourers, and enter into the forest areas very rarely. It was also found that the death/killing of elephant and tiger is in unforeseen and alarmingly increasing trend, and poses challenge for the managers and conservationists. Illegal activities such as hunting, using country made bomb and illegal electric fence made by local people reasoned for killing on the apex species exhibits their anti conservation attitudes towards wildlife conservation. The continued negative attitude by local people may result in local extinction of some animals in this division. Therefore, it is unreasonable to treat conflict as an aberration, rather it must be recognized at the very outset that conflict can, at best, only be managed, and never eliminated.

Conclusion and Management Recommendations

The present study of HAC paved a way for suggesting the following recommendations for the better management of this forest division for the long term conservation of wild animals.

1. Establishment of solar power fence with community participatory approach along the fringe areas would find permanent solution for the man-animal conflict issues in this region.
2. It is necessary to ensure and protect the corridor of Mudumalai TR-Naiduestate-Northernhey-27th mile (Ooty-Gudalur highway)-Gudalurmalai-Balmadi-Guind-Newhope-Glenvence-Moolakadu-Pulikundha-Umblimoola-Shanthiestate-Sathyakumarestate-Mountrose-Periyasholai-Keezhnadugani-Nilambur-NewAmarambalam-Silent Valley NP, since major land areas in this corridor are belonged to wealthy planters, it would be easily negotiated and secured this corridor.
3. Awareness creation through education and some biological (Eco-friendly) mitigation measures need to be suggested for the other conflict areas through people participatory approach in this forest division.

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