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Factors Mitigating Man-Animal Encounters in Tamil Nadu – A Case Study

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ABSTRACT

As human populations expand into wild animal habitats, natural wildlife territory is displaced. Reduction in the availability of natural prey / food sources, shrinkage of habitat lead the wild animals to seek alternate sources. New feed resources created by humans adjacent to forest floor draw the wildlife voluntarily to the non-forest floor resulting in human-animal conflicts. The human conflict is often taking place with the iconic animals like Tigers which has gradually increased since 1970s, when India launched a nationwide Tiger Conservation Program that carved out sanctuaries in National parks and made it a crime to kill a big cat. Considering the importance of protecting the wild animals and to identify the reasons for human animal conflicts in the wilder zone or in the forest fringes, a Case Study approach has been practiced in the Anamalai Tiger Reserve of Tamil Nadu. Among the various animal population, the herbivore population alone accounted for 98 per cent. Only two per cent of the wild animal population is with Carnivore animals like Tiger, Leopard, Wild Dog and Sloth Bear. Among the three carnivores selected, Tiger and Leopard became the best in hunting of the needed prey whereas, the Tiger is found to hunt whatever it come across when the hunting process is on. But its preference is towards Sambar Deer which is accounted for around fifty per cent. This is visible in respect of Leopard too; its preference towards Sambar Deer is accounted for 36 per cent. Nilgiri Langur formed the prey to wild carnivores which is accounted for only 3 per cent which is visible in the Scats of Leopard. If nothing is available, Langur is the last choice as food to the Leopard. Besides, the factors which are actually favoring the conflicts between the human and the wild animals is also studied and are discussed in detail.

Keywords: *Man - Animal Conflicts; Factors Influencing Conflicts; Scat Analysis; Project Tiger; Project Elephant, Tiger Reserve;*

INTRODUCTION

Man – Animal Conflicts is defined as any interaction between humans and wildlife that results in negative impacts on human social, economic or cultural life, on the conservation of wildlife populations, or on the environment.

The United States Geological Agency defines human-wildlife conflict in two contexts; firstly, actions by wildlife conflict with human goals, i.e. life, livelihood and life-style, and, secondly, human activities threaten the safety and survival of wildlife. However, in both cases, outcomes are decided by human responses to the interactions (Cline et.al. 2007)

The advent of farming practices including animal husbandry of the Neolithic Revolution increased the scope of conflict between humans and animals. The crops and the produce formed an abundant and easily obtained food source for wild animals. Wild herbivores competed with domesticated ones for food and fodder. In addition, they were a source of diseases which affected livestock and livestock rearing practices in Toto. The livestock attracted predators which found them an easy source to prey on. The inevitable human reaction was to eliminate such threats to agriculture and domesticated animals. In addition, land was converted to agricultural and other uses by destroying forest land, all of which impacted wild animals adversely. The grazing lands in the wilder zone was also brought to damage for crop cultivation and other requirements.

A number of animal species were eliminated locally or from parts of their wild range due to absence of living conditions to the animals. The deliberate or accidental introductions of animals in

isolated island animal communities have caused extinction of a large number of species.

Nature of Man-Animal Conflicts

As human populations expand into wild animal habitats, natural wildlife territory is displaced. Reduction in the availability of natural prey/food sources leads to wild animals seeking alternate sources. Alternately, new resources created by humans draw wildlife resulting in conflicts. The population density of wildlife and humans increase with overlaps in geographical areas used increasing their interaction thus resulting in increased physical conflicts. Byproducts of human existence offer un-natural opportunity for wildlife in the form of food and sheltered interference and potentially destructive threat for both man and animals. Competition for food resources also occurs when humans attempt to harvest natural resources such as fish and grassland pasture. Another cause of conflict comes from conservation biased toward flagship or game species that often threatens other species of concern (Wikipedia)

The Outcomes of Conflicts

Human–wildlife conflict occurs with various negative results. The major outcomes of human-wildlife conflict are;

- Injury and loss of life of humans and wildlife
- Crop damage, livestock depredation, predation of managed wildlife stock.
- Damage to human property.
- Trophic cascades.
- Destruction of habitat.
- Collapse of wildlife populations and reduction of geographic ranges (Woodruff, 2005).

The Problem Focus

A deadly conflict is underway between India's growing masses and its wildlife, confined to ever-shrinking forests and grasslands, with data showing that about one person has been killed every day for the past three years by roaming Tigers or rampaging Elephants. Statistics released by the environment ministry count a total of 1,144 people killed between April 2014 and May 2015. That includes 426 human deaths in fiscal 2014-15, and 446 killed in the following year. The Ministry released only a partial count for 2016-17 of 259 killed by Elephants up to February 2017, along with 27 killed by Tigers through May 2017 (Hindustan Times, 2017).

"Conflict is already one of the biggest conservation challenges," said Belinda Wright, the founder of the Wildlife Protection Society of India, based in New Delhi. "In India it is particularly acute because of the high human population."That population of 1.3 billion is still growing, and as it does it is increasingly encroaching into the country's traditional wild spaces and animal sanctuaries, where people compete with wildlife for food, fodder, fuel and other resources.

The growth of human settlements is often seen as economic development. But for some who are living on the edge of wildlife borders, this development can come at a high cost.Of the 1,052 lives claimed by the Elephants in the last three years, many had simply been in the way when the pachyderms wandered out of jungles in search of vegetation and raided farmers' crops. Wildlife experts say these conflicts have increased as Elephants increasingly find their usual corridors blocked by highways, railway tracks and factories (Hindustan Times, 2017).

"The shrinking of good quality habitats and access of the animals to movement corridors are absolutely critical for the future of its iconic mammals. The human conflict with Tigers has gradually increased since the 1970s, when India launched a nationwide Tiger conservation program that carved out sanctuaries in national parks and made it a crime to kill a big cat. Though methods for counting Tigers have changed, census evidence suggests the number has increased from about 1,800 then to 2,226 in 2014. But the increase in Tigers hasn't been met with a proportional increase in habitat, activists say (Hindustan Times, 2017).While the government did not provide any numbers for deaths caused by other big cats, conflicts with leopards have become so common that villagers regularly mount hunting parties when one ventures near their homes, threatening children and livestock. India's Elephants and Tigers are also some of the most hunted animals in the country, sought for their ivory tusks or bones that are sold on the black market for use in traditional Chinese medicine without any evidence that they have an effect.

Elephants are also threatened by speedy trains and three Elephants were killed due to the speedy train near Madukkarai of Coimbatore, Coimbatore District, Tamil Nadu. Like that several deaths are happening to Human as well

as to the Wild Animals. What were the reasons to face with such conflicts between the human and the wild animals? Still many of them could not answer to the emerging problem or finding solutions. Even if they found the solutions and tried to implement, after certain time, the animals learnt to violate and hence the author has made a small attempt to understand the Tiger Reserve and attempted to highlight the nature of forests in the Reserve, Facilities provided to the wild animals for keeping them in their wilder environment, factors facilitating the human animal conflicts in the reserve, schemes in vogue to protect the animals and the human friendly living and to suggest the appropriate strategies to augment the animals in the wilder zone.

DESIGN OF THE STUDY

Methodology refers to the blueprint or set of decisions and procedures which governs a study and makes it understandable to others. It is also subject to inquiry, criticism, replication and adaptation to other settings (Guthrie,2010). The research methodology is an approach used to justify the methods adopted for research leading to creation of data for analysis of research under consideration (Carterand Little,2007). The types of research Methodologies available are quantitative and qualitative (Lapan et al.,2012).

Quantitative Methodology

The quantitative methodology is used where the number of respondents are more and the data can be effectively measured using quantitative techniques such as Statistical Package for the Social Sciences (SPSS) (May, 2011).

Qualitative Methodology

The aim of the methodology is to examine the interpretation of the reality from the respondents'view point (Bryman,2015). The effective means of creating a framework where the respondent is to provide response to the interviews or texts and the response to the interviews can be open.

Research Strategy

The research strategy is the technique adopted by the researcher to perform the study on the topic of interest (Saunders et al.,2009). There are various steps involved in strategizing a research which might include identifying the scientific problem, the experimental design, data types, methods and experimental techniques (Benestad and Laake, 2015). Saunders et al. (2007) identified different approaches such as case study research, experimental research, interviews, action research, literature reviews and surveys. The current research is concentrated on identifying the factors which influences the human – animal conflicts which translated to adopt case study as the research strategy. It is the assessment of single unit which establishes the key features and generalizations of the case in consideration (Bryman,2015). It also provides an in-sight about the specific nature of culture or context in comparison to other cases (Silverman,2013).

Data Analysis

In the current research, the interview method is adopted, as the qualitative methodology is based on the inductive approach, the patterns are derived from the data as a preconditioning for the study (May, 2011). The interview data is arranged accordingly to the common factors exhibited by the respondents, the results of the research are established based on the data and its best fit with the current framework of research design (Luo and Flick, 2012; Randall and Mello, 2012). The interview strategy in the researches are conducted in the area of social sciences (Bryman, 2015).

Considering the importance of protecting the wild animals and to identify the reasons for human animal conflicts in the wilder zone or in the forest fringes, a Case Study approach has been practiced in the Anamalai Tiger Reserve of Tamil Nadu. For that Case Study, the Field Director of Anamalai Tiger Reserve and the staff members at different levels were discussed for want of first-hand information on Human-Animal Conflicts. Besides, the secondary data available with the Tiger Reserve were also collected from the records of Tiger Reserve and analyzed using conventional percentage analysis.

Though there were six ranges in the Tiger Reserve, the author could not perform a field visit to all the ranges but have visited only the Anamalai Tiger Reserve located in the Pollachi and Ulandy Range were alone performed and the interactions were made with the protection officials of the ranges. In addition to this, the wild life experts, the field personnel in the Wild

life Protection Society, the Scientists whom are dealing the issues are also discussed and their experiences were taken note off to document the results in an appropriate manner (Table 1).

Table 1. *Details of Experts Considered and Selected for Conducting the Study*

Sl. No	Details of Contact Person	Number of Contacts
1	Field Director of ATR	01
2	Biologist of ATR	01
3	Forest Range Officers	02
4	The Wild Life Scientists	03
5	Field Personnel	02
6	Common Public	06
	Total Number of Contacts Made	15

The Sample Size

The sample size is a representation of number of participants selected from the overall data set which are used in the research (Newman and Benz, 1998). In quantitative research, the sample size is most fundamental as the precision of the outcomes are directly linked with the sample size. For instance, the sample size less than 50, tends to produce results of lower accuracy as the results are dependent on the people providing data. The people who provide data tend to skew the results, hence it is suggestive to have larger sample size thus producing more reliable and accurate results (Flick, 2015).

In qualitative research methodology, the sample size is less important and has a sample size from 15 to 30 (Moen and Middelthon, 2015) which is found sufficient since the qualitative survey has been conducted with the experts of Wild Life of Anamalai Tiger Reserve, especially the Field Director, Mr. V. Ganesan belonged to the Indian Forest Service of Tamil Nadu Cadre had 35 years of rich experience in the forests capable of manning the in-and-outs of the Man-Animal Conflicts. The data related to the factors and suggestions for mitigating the conflicts are of exclusive thoughts of Mr. V. Ganesan, the Field Director of the Tiger Reserve who is enforcing the same in the Tiger Reserve to control the conflicts between the human and the animals. Amidst his excellence, the other personnel have also been discussed for their opinion and the details of personnel are delineated in Table 1. Their excerpts formed the backbone for detailed analysis of the research work and the details are discussed in the Results and Discussion section.

Analysis of Feeding Habits of Carnivores

Determination of feeding habits of Carnivores become most important to cross check whether the feed stocks are available sufficiently in the reserve or not. Since direct checking of feeding habits of carnivores becomes a cumbersome process, the indirect way of detecting their feeding habits could be made through their Scat Analysis.

For this study, the data available with the records of Anamalai Tiger Reserve in respect of Scat analysis of carnivores have been taken into consideration for analysis to assess the feeding habits of carnivores.

Period of Study

The study was carried out in the Anamalai Tiger Reserve, Pollachi between November 2017 and January 2018. Besides the data collected during the Wild Life Census 2017 were also used particularly for Scat analysis.

Results and Discussion

The perceived information from different experts through repeated administration of questions to get the real information about the Tiger Reserve without any overlapping. If any overlapping is visible, the same has been verified again and the same are processed in tabular statements and are properly analyzed by using conventional percentage analysis and the results are discussed in different heads as under.

- Forest Cover of India and Tamil Nadu
- Milestones of Anamalai Tiger Reserve
- Activities of Anamalai Tiger Reserve
- Wild Animal Population in the Tiger Reserve
- Type of Human-Animal Conflicts
- Factors Influencing Human-Animal Conflicts
- Strategies to Mitigate the Conflicts

Forest Cover of India and Tamil Nadu

A country's prosperity lies with its vast natural resources especially the Forest and other resources like water, land for agricultural and allied activities. Higher percentage of forest cover would naturally augment higher biodiversity, capable of attracting rain forming clouds, protects streams and ensure filling of ponds and tanks which in turn promotes agriculture and allied sectoral development. Hence a growing nation will always keen on developing the forests and its biodiversity richness. Since this study focuses on factors influencing the human animal

conflicts, one has to assess the reasons and causative factors in particular. The author considers area under forests is one of the influencing factors and hence the detail of forest cover is analyzed and the results are presented in Table 1.

Table 1. *Forest Cover of India*

Sl. No	Class of Forests	Area in Sq. Kms	Percentage to Geographical Area
1	Very Dense Forests	98158	02.99
2	Moderately Dense Forests	308318	09.38
3	Open Forests	301797	09.18
4	Total Forest Cover	708273	21.54
5	Scrub Jungle	45979	01.40
6	Non Forest Areas	2533217	77.06
7	Total Geographical Area	3287469	100.00
Forest Cover of Tamil Nadu			
1	Very Dense Forests	3672	02.83
2	Moderately Dense Forests	10979	08.44
3	Open Forest Areas	11630	08.94
4	Total Forest Cover	26281	20.21
5	Non Forest Areas	103779	79.79
6	Total Geographical Area	130060	

The total geographical area of the country is 329 square kilometers. Out of which the forest cover is accounted for only 21.54 per cent indicating that the country is devoid of forest cover to the tune of 12 per cent to meet the recommended forest cover of 33 per cent to the total geographical area. Hence, the nation like India has to make hard efforts to bring the higher area under forests focusing the trees outside forest environment besides protecting the existing forests. If forests are left undisturbed for certain period of time like ten years or more, the natural regeneration could enrich the forest cover and the open forest becomes moderately dense and the moderately dense becomes dense forests and the dense forests become the shola forests where one could expect higher biodiversity.

The Scrub Jungle is accounted for around 1.40 per cent. These scrub jungle should be elevated as fodder bank without disturbing the natural vegetation so that the dominance of herbivores and its migration to farm fields in the boundaries could be checked. When comparing the forest cover at national level and the forest cover in the state of Tamil Nadu, Tamil Nadu forest cover is almost equal to the national forest cover. The nation's forest cover is marginally ahead when comparing the figures of Tamil Nadu and hence green budgeting should be brought in by both central and state governments and forest accounting should be taken care on an annual basis or once in two years. The disturbance due to the growth of *Prosopis juliflora* in the forest fringes and in the open forests are the big impediment to the conservation related activities and hence the growth of Prosopis should be checked on an annual basis to permit the growth of fodder trees to the herbivores.

Milestones of Anamalai Tiger Reserve (ATR)

Anamalai Tiger Reserve (ATR) falls in one of the 25 Global hot spots of biodiversity in the Western Ghats which has an undulating topography and diverse climate variations which supports variety of flora and fauna including many endemics. The richness of wild life in this area is one of the major attractions for wild life enthusiast and researchers in the field. Faunal diversity of Anamalais is very rich with endemic mammals like Nilgiri Thar, Nilgiri Marten, Nilgiri Langur, Lion Tailed Macaque etc. In this respect, one has to document the milestones it come across over the years becomes important and hence these details are presented in Table 2.

Table 2. *Mile Stones of Indira Gandhi Tiger Reserve in Tamil Nadu*

Sl. No	Particulars of Tiger Reserve	Focus	Year / Area
1	Year of Establishment	Conservation	1848
2	Total Area of the Reserve	Square KMs	958.59
3	Wild Life Reserve	Conservation	1976
4	Elephant Reserve	Elephant	2003
5	Indira Gandhi Tiger Reserve	Tiger	2007

Table 2 revealed that the total area of the Tiger reserve is around 958 square kilometers. The total area is distributed and bifurcated into 6 forest ranges based on the vegetation and biodiversity richness (Table 3). The establishment

of Tiger reserve during the earlier period of 1848 is with the focus of Conservation of both flora and fauna without giving priority to the Tiger. During the year 1976, the area has been given a focus of conserving the wild life available in the reserve. Later on, considering the number of Elephants available and the ecotourism importance, the reserve has been designated as Elephant reserve with a focus of conserving the wild and captive Elephants during the year 2003.

The year 2007 has witnessed the change in the focus of conservation and the reserve has been designated as Indira Gandhi Tiger Reserve with the focus on conserving the top layer of the wild animal, the Tiger. If one could conserve the Tiger, then all the food pyramids could be saved and protected. With the understanding, the Anamalai Tiger Reserve had the separate office at Pollachi to conserve the Wild animals with the Field Director in the capacity of Chief Conservator of Forests and the management plans are periodically prepared by taking stock of the faunal and floral diversity and the gap in the diversity and their population is examined and the gaps are merged with appropriate policy and executive actions.

Through this concerted efforts, one could see that the population of wild animals would have been increased in different ranges.

Table 3. *Details of Wild Life Range Areas in Anamalai Tiger Reserve*

Sl. No	Name of the Wild Life Range	Area in Sq. Kms	Percentage to Total
1	Amaravathy Range	201.34	21.00
2	Manomboly Range	138.96	14.50
3	Pollachi Range	107.91	11.26
4	Udumalpet Range	246.67	25.73
5	Ulandy Range	081.11	08.46
6	Valparai Range	182.60	19.05
	Total Area of the Tiger Reserve	958.59	100.00

The Tiger Reserve had six forest ranges headed by a Forest Range Officer separately with his team to protect and conserve the wild animals. Among the six ranges, the Udumalpet range is found to have higher area followed by Amaravathi Range which are respectively in possession of 26 per cent and 21 per cent of forest area. The Ulandy Range is the smallest one which caters the need of administrative units of Anamalai Tiger Reserve in Top Slip which is flooded with more activities. Though it had several activities, fodder development initiatives for the herbivores in the forest fringes of Anamalai Tiger Reserve needs momentum to check the invasion of the Pachyderms.

Activities of Anamalai Tiger Reserve

Various activities are in vogue with the Anamalai Tiger Reserve. They are furnished as follows

- Elephant Camp at Topslip
- Medicinal Plants Conservation Area (MPCA)
- Wild Life Watch Towers
- Bird Watching
- Elephant Safari
- Vehicle Safari and
- Eco Shop

Elephant Camp

The ATR is manning an elephant camp at Topslip from 1956 onwards. The camps are located at Kozhikamuthi and Chinnar tribal pockets. At present there were 23 Elephants in these camps. The captive Elephants are trained and managed by the tribes present in the tribal villages.

The tribes are also used for patrolling of wild Elephants which makes an entry towards non forest environment and if any trouble is observed from the wild Pachyderms, the Kumki's from Elephant camp will come to the rescue.

Medicinal Plants Conservation Area

Tamil Nadu is blessed with 11 Medicinal Plants Conservation Areas in different forest circle. Topslip encompasses many endangered, endemic, rare and threatened species of plants for conservation. As part of conservation effort, the medicinal plant produce may be produced and supplied to the need based Siddha and Ayurveda pharmaceuticals to derive its benefits in a big way to support the healing practices followed in the hospital.

Wild Life Watch

An Interpretation Center was established at Topslip to screen the Wild life related movies and documentaries for the Day visitors and tourists who are staying at Topslip. This is mainly to enrich the knowledge on wild life and create awareness for conservation of forests and

wild life and to prescribe the importance of conservation and its efforts by the Department of Forests.

Bird Watching Paradise

Anamalai Tiger Reserve located in the South of Western Ghats is a birders paradise. The wide variety of forest habitats found in Anamalai supports over three hundred species of birds, including 28 species of birds endemic to the Western Ghats. Some of the notable key species found in Anamalai includes Great pied hornbill, Ceylon frog mouth, Malabar parakeet, Nilgiri Pipit, Grey headed Bulbul, Malabar Lark etc.

Elephant Safari

The elephant safari ride offers an enchanting experience, viewing the picturesque forest landscapes from the back of our camp Elephants. The elephant safari is the one among the many loved programs by the tourists to the Topslip. Besides this, the vehicle safari is also arranged for the tourist personnel every day both in the morning and evening preferably before 5 pm. These are somewhat revenue earning opportunities for the department to support with other activities and their sustenance.

Eco Shop

An Eco Shop is established in Topslip to provide livelihood to the local tribes. The Eco Shop is capable of providing medicinal and aromatic oils, spices drawn from the forest floor, Tea powder, Caps and T-Shirts with the logo of ATR. Besides these, honey collection and selling is also activated through the Eco Shops. Through that the tribes are getting more number of employment for them and their wards. However, when one could examine the honey processing activity carried out by Parambikulam Forest Division, Kerala, the Eco Club activities are commendable and capable of generating higher employment. Though there were many activities in the Tiger Reserve, the candle manufacturing activity by utilizing the remains of honey wax, soaps and other cosmetics and the same may be supplied to the city consumers by establishing their retail outlets in the city. These are the supporting activities to the tribes for making conservation effort to the fullest part in protecting the wild animals.

Wild Animal Population

India is home to several well-known large mammals, including the Asian Elephant, Bengal and Indochinese Tigers, Asiatic Lion, Indian Leopard, Indian Sloth Bear and Indian Rhinoceros. The need for conservation of wildlife in India is often questioned because of the apparently incorrect priority in the face of direct poverty of the people. However, Article 48 of the Constitution of India specifies that, "The state shall endeavor to protect and improve the environment and to safeguard the forests and wildlife of the country" and Article 51-A states that "it shall be the duty of every citizen of India to protect and improve the natural environment including forests, lakes, rivers, and wildlife and to have compassion for living creatures. It is learnt that the number of wild animals and their population is increased marginally due to conservation effort made by the Officials of ATR and hence the details were analyzed and the number of wild animals available during the year 2017 is presented in Table 4.

Table 4. *Wild Animal Populationas per Wild Life Census 2017 in the Anamalai Tiger Reserve*

Sl. No	Name of the Animals	Number of Animals as per 2017 Census	Percentage to Total
1	Elephant	0550	01.74
2	Gaur	5286	16.73
3	Sambar Deer	6717	21.26
4	Spotted Deer	2500	07.92
5	Barking Deer	1627	05.16
6	Wild Boar	2800	08.86
7	Common Langur	2997	09.49
8	NilgiriLangur	4839	15.32
9	Bonnet Macaque	2168	06.86
10	Lion-Tailed Macaque	550	01.74
11	Slender Loris	200	00.63
12	NilgiriTahr	600	01.90
13	Malabar Squirrel	756	02.39
Total Herbivores		31590	100.00 (98.26)
14	Tiger	29	05.19
15	Leopard	130	23.25

16	Wild Dog	250	44.73
17	Sloth Bear	150	26.83
Total Carnivores		559	100.00 (01.74)
Total Wild Animals		32149	(100.00)

(Figures in Parentheses indicate Percentage to Total Number of Animals in the Tiger Reserve)

Table 5. *Density of Bamboo Available in the Recorded Forest Area of Tamil Nadu (Sq. Kms)*

Sl. No	Details of Bamboo Area	Area in Sq.Kms	Percentage to RFA
1	Pure Bamboo Area	023	00.10
2	Dense Bamboo Area	718	03.14
3	Scattered Bamboo Area	2265	09.90
4	Bamboo Present but Clumps Completely Hacked	163	00.71
5	Regeneration of Bamboo	985	04.31
6	Non- Bamboo Areas	18723	81.84
7	Recorded Forest Area (RFA)	22877	100.00

Table 4 revealed that the Anamalai Tiger Reserve had the wild animal population of 32149 in numbers. Out of which the herbivore population alone accounted for 98 per cent. Only two per cent of the wild animal population is with Carnivore animals like Tiger, Leopard, Wild Dog and Sloth Bear which eats whatever the prey that caught by the carnivores. The details of its prey were detected by analyzing the scats of those carnivores which are presented separately. Though the Carnivores are dangerous animals, its occurrence in the night hours are more predominant as they are nocturnal in nature but they could also move in the early evening as they are hungry and for want of food and water requirements. Among the carnivores, the Wild Dogs and Leopard are respectively accounted for 45 per cent and 23 per cent to the total carnivorous animals.

Feed Stock of Bamboo for Herbivores

Another group of wild animals are Herbivores. Among these, the Elephants are ranking in the top pyramid which needs heavy feeding when compared to other herbivore animals. Since the Elephant's pet food is Bamboo, its occurrence and distribution inside the forests are much important to the researcher and hence the Bamboo density is also analyzed and the results are presented in Table 5.

Table 5 revealed that the Total Recorded Forest Area is arrived at 22877 Sq. Kms. Among these, the Bamboo area including the regeneration of Bamboo is accounted to be only 18 per cent. Since the Elephant population in the Tiger Reserve is arrived at 550 in numbers, the per day availability of Bamboo is found to be less and hence the development of Bamboo area needs to be increased considering the interest of biodiversity as King Cobra is endemic to this reserve. Higher density of Bamboo will automatically attract several other species which harbors the root zone of Bamboo bush. In this circumstance, the Tiger Reserve can attract the funds from National Bamboo Mission to Promote the Bamboo in the Reserve Forest environs.

Among the herbivores (Table 4), the Deer and Gaur alone are accounted to be around 50 per cent of total herbivores and hence special efforts need to be created for their feeding focusing the open forest environment and Scrub Jungle forests so that the herbivores will not cross border the forest to the farm environment which in turn will avoid the invasion of carnivores too. Besides, the farms adjacent to the forest floor should be strictly advised not to raise the animal loving crops for the betterment of the farmers and the wild animals.

Feeding Habit of Carnivores

Tigers are carnivores, meaning that their diet consists of meat, flesh, and fats of animals that they catch. This is where they get all of their protein and other dietary requirements in order to conduct day to day activities.

It's hard to say whether or not Tigers have a preference in what kind of meat they eat or if they are just eating what is available and easiest to catch. They will eat everything that they can catch and kill. This often includes Boars, wild Pigs, Bears, Buffalo, wild Cattle, Deer, Antelopes, and even weak or young Elephants. When large prey is not available, they are known to feast on lizards, crab, toads, birds, and fish.

These animals are one of the most deadly creatures on earth because of their "Cat-like reflexes". They are known to reach speeds of over 50 KMs per hour for short distances and can out-jump any other animal on earth. They

can close in on whatever they are targeting well before they have a chance to even consider making a run for cover. Unless you can climb high into the jungle canopy, there is not much you can do to escape a Tiger.

As already discussed, analyzing the feeding habit of carnivores is important on the lines of cross checking the feed stocks which are available in the Tiger Reserve. In this respect, the indirect way of analyzing the feeding habit by checking or analyzing the scats of carnivores to determine their feeding habits.

For that purpose, the occurrence of 26 Scats of Tiger; 28 Scats of Leopard and 12 Scats of Wild Dogs during the wild life census were collected separately and the Scats are carefully analyzed by the Department of Forests and the details available with them are further analyzed and the results of Scat Analysis are presented in Table 6.

Table 6. *Scat Analysis of Predator Species of Anamalai Tiger Reserve*

Sl. No	Name of the Prey	Frequency of Occurrence of Prey Remains in Per Cent		
		Tiger	Wild Dogs	Leopard
1	Sambar Deer	50.00	33.00	36.00
2	Wild Boar	08.00	00.00	18.00
3	Porcupine	19.00	00.00	00.00
4	Nilgiri Langur	15.00	00.00	03.00
5	Chital	08.00	67.00	21.00
6	Common Langur	00.00	00.00	04.00
7	Barking Deer	00.00	00.00	18.00
	Total	100.00	100.00	100.00

(Source: ATR, Pollachi)

Table 6 revealed the details of Scat analysis of carnivores like Tiger, Leopard and Wild Dogs. On examining the Scat of Tiger, its prime food found to be the Sambar Deer which formed 50 per cent of Tigers' diet followed by Porcupine formed 19 per cent and the NilgiriLangur accounted for 15 per cent to the total. Wild Boar found to be very less and it is accounted for only 8 per cent. From that one could infer that the Tiger is aiming for Deer as their main food which will be sufficient for a meal in the Jungle. If hunting of deer is missed, then the other animals formed its food due to occurrence in its vicinity.

In respect of Leopard, the Scat analysis revealed that Sambar Deer formed their major food (36 per cent) followed by Chital which is accounted for 21 per cent. Barking Deer and Wild Pigs formed the other preferred foods which are respectively accounted for 18 per cent each. From that one could infer that the Leopards are very active in searching and killing the prey animals for its food. When comparing the Scats of Tiger and the Leopard, it is to be accepted that the Tiger hunts the animals whatever it come across. Whereas, the Leopard is choosing the prey as its food.

When one could examine the Scats of Wild Dogs, Chital found to be the major share of its food which is accounted for 67 per cent to the total followed by Sambar Deer formed the food to the tune of 33 per cent. The reason for preference of Chital as their main prey is it is almost equal in size of Wild Dogs and found easy in hunting as Sambar Deer is so fast in running and hence its catching is difficult. But the methodology of hunting of Sambar Deer by the Wild Dogs is interesting and they encircle the prey immediately after identification and perform whistle to invite their counterparts for hunting the prey. In that circumstances, the escape of Deer becomes difficult and becomes prey to the wild dogs. When examining the Scats of Wild Dogs, none other food residue is visible.

To sum up, among the three carnivores selected, Leopard becomes best in hunting of the needed prey whereas, the Tiger is found to hunt whatever it come across when the hunting process is on. However, the preference of Tiger and the Leopard is found to be mainly the Sambar Deer based on the Scat analysis. Like Leopard, the Wild Dogs are also choosy in determining their food. Nilgiri Langur formed the prey to wild carnivores which is accounted for only 3 per cent which is visible in the Scats of Leopard. If nothing is available, Langur is the last choice as food to the Leopard.

Type of Human – Animals Conflicts

So far the discussion is made in respect of assessing the forest cover for the shelter of wild animals, population of wild animals, their feeding habits in detail. Amidst all these, the

animal and the human conflicts are taking place either in the jungle or in the periphery of forest floor. Let us discuss how the human-animal conflicts are taking place and who is mostly affected in the conflicts held in the jungle or in the fringes of jungle.

Such things are important to understand and prescribe the need based actions to combat the conflicts. The details of type of conflicts happened in the Tiger Reserve is analyzed and the results are presented in Table 7.

Table 7. *Type of Conflicts happened in the Tiger Reserve in a Decade of Time*

Sl. No	Nature of Attack	Type of Attack	Number of Attacks
1	Panther Attack on Human	Death	08 (22.22)
		Injury	10
2	Panther Attack on Livestock	Death	46 (95.83)
3	Elephant Attack on Human	Death	22 (61.11)
		Injury	14
4	Elephant Attack on Assets	Damage	131
5	Crop Damage due to Elephants	Browsing	229
6	Bear Attack on Human	Death	02
		Injury	09
7	Bison Attack on Human	Death	06 (16.67)
		Injury	12
8	Wild Boar Attack on Human	Injury	30
9	Crop Damage due to Wild Boar	Damage	37
10	Wild Boar Attack on Livestock	Death	02 (04.17)
11	Total Compensation Paid	Rupees	12317000
12	Total Death of Human due to Wild Animals		36 (100.00)
13	Total Death of Livestock due to Wild Animals		48 (100.00)

Table 7 revealed that the human-animal conflicts are taking place mostly in the periphery of the forest ranges. The people used to migrate for fuel wood collection, toiletry requirements, and fodder collection and for cattle grazing or in the Tea Estates while they are collecting the fresh leaves of tea bushes. The Panther attack on human is reported to be 18. Out of which fatality to human is around 8 which is accounted for 22 per cent to the total fatality to human. Whereas the death caused to human by the Elephants was accounted to be 61 per cent. The human death happened due to Gaur (Bison) is accounted for 17 per cent to the total. The animals are forced to attack on the human is mainly based on self-defense and not for want of food. So far, none of the tribes are being attacked by the elephant or by the Tiger or Panther.

Because, they know their movements and the movements are judged by observing their smell and even the tribes used to converse with the Elephants in their own language when it comes by the way. The death happened to the human belonged to non-tribes who did not know the animal behavior, animal movement, animal corridor, the time of movement, purpose of movement, absence of skills to detect the wild animals, if they happened to move inside the forests. Because of these, face to face intervention becomes possible and death happened to the human being.

Whereas, the Cattle lifting is quite common as the predator animals used to browse in the forest floor for food and try to hunt whatever the animal come across. While wandering for food, if the cattle are visible, it takes the cattle without any much resistance from the prey because they cannot move or run from the domicile and becomes easy to the predator animals. Once it had started lifting such animals, its next turn is also possible unless proper protection is made to the cattle in the household premises. To avoid the human-animal conflicts many efforts were taken to inform the movement of animals to the human during the day time, Elephant Mobile Squad is also in operation and erection of sensors to detect the movement of animals in the wild zone and caution the human in the residential environments nearby the forest fringes. One such effort taken by the Gudalur Forest Division is furnished for your information.

In an effort by the Gudalur Forest Division, Ooty, a forewarning system near to a school was made to inform the residents about the movement of Elephants in the area as the school is nearby the elephant corridor. According to the Forest Range Officer of Bitherkad range, the school has an alarm and lights that would go on when animals cross the sensor attached to it. It will

make people to take precautionary measures accordingly (The Hindu, 2018). This effort has been taken by the District Forest Officer of Gudalur Division as the Elephants used to cross regularly and hence the forewarning system will be of much useful.

Table 8. *Details of Human-Animal Conflicts over years in the Tiger Reserve of Tamil Nadu*

Sl. No	Year	Man – Elephant Conflicts		Man-Panther Conflicts		Man-Gaur Conflicts		Other Conflicts	
		Death	Injury	Death	Injury	Death	Injury	Death	Injury
1	2007-08	02	02	01	01	00	00	00	00
2	2008-09	01	00	01	02	02	00	00	00
3	2009-10	01	00	00	00	00	00	00	00
4	2010-11	04	00	02	02	00	00	00	00
5	2011-12	02	04	02	01	00	01	00	05
6	2012-13	02	02	01	01	02	02	01	04
7	2013-14	00	02	00	01	00	01	01	03
8	2014-15	02	01	00	02	01	02	00	05
9	2015-16	03	01	00	00	01	03	00	11
10	2016-17	00	00	00	00	00	00	00	05
11	2017-18	05	02	01	00	00	03	01	06
Total		**22**	**14**	**08**	**10**	**06**	**12**	**03**	**39**
Mean		02	01.27	00.73	00.91	00.55	01.09	00.27	03.55

When one could examine the human-animal conflicts in a decade of time, the human death seems to be 22 in numbers with an average of 2 deaths per annum due to the Elephants. In respect of panther attack, on an average, one human being is affected to death and the death of one human due to Gaur happened every two year. On examining the stream of death of human over the years, it is found to be an incidental death. The incidental death is mainly due to the carelessness of human folk inside the Tiger Reserve. If one could take precautionary efforts, the deaths could have been avoided and the reserve could be a pleasant one to them on following the instructions of the Tiger Reserve officials or the fore-warning given by the tribes and other authorities in the reserve. Towards the death and injury of human and their cattle lifting by the wild animals, so far 123 lakhs have been paid as compensation by the Anamalai Tiger Reserve (Table 7).

Provision of compensation to the human being on the death of human and their livestock within the Tiger Reserve means, it should be banned. If the animals cross-border the Tiger Reserve and becomes causative to death of human and the livestock, then the compensation should have been given and the same should be re-examined for revision to some high amount per death. It may be due to at least a minimum of five lakhs per death of human and the cattle may be given with based on the present value of cattle raised in the farm. Illegal deaths due to poaching, anti-legislative activity should be penalized by collecting or fining the respondent family. To evacuate poaching and other anti-smuggling from the forest for timber and other wild life products, establishment of anti-poaching squad becomes most important and hence the details of anti-poaching squad available with the Tiger reserve have been analyzed and the details are presented in Table 9.

Table 9. *Establishment of Anti-Poaching Squads Anamalai Tiger Reserve*

Sl. No	Details of Protection Arrangements	Number of Units	Percentage to Total
1	Anti-Poaching Squad Members	141	77.90
2	Anti-Poaching Units	037	20.45
3	Elephant Protection Mobile Squad	002	01.10
4	Animal Movement Forewarning Unit	001	00.55
	Total	181	100.00

Table 9 revealed that the Anamalai Tiger Reserve had 37 Anti-Poaching units to prevent poaching of timber, arrest Ganja cultivation and distribution, wild animal products and hunting of wild animals for meat and medicinal importance.

The composition of anti-poaching units include the forest officials of ATR, Tribes belonged to that locality and the Deputy Director of the Tiger Reserve which was periodically updated

and reconstituted by the Field Director cum Chief Conservator of Forests of ATR for maintaining secrecy and to develop appropriate strategy and its implementation.

Besides anti-poaching squad, two mobile squad has been established for monitoring the elephant movement so as to fore-warn the common public and the reserve authorities suitably. In addition to these, Short Message Service facility provided to the residents in and around the reserve of 2 KMs radius are also initiated. Apart from these efforts, somehow the conflicts were happened in the reserve and hence the monitoring team may be thought off comprising the top officials and the Forest Range Officer personnel to make the team vigil during the nocturnal hours to minimize the conflicts and the fore-warning as practiced by the Gudalur Forest Division officials may also erected in the ATR on finding the success of the unit so as to alert the common public.

Trade of Wild Life Products

Amidst all these tight protection arrangements, the poaching is unable to be controlled to the fullest extent by the officials due to huge demand for the wild life products abroad and hence these details are analyzed and the results are presented in Table 10.

The wild life products generated by way of poaching causes illegal trade. Illegal trade can involve the trade of living or dead individuals, tissues such as skins, bones or meat, or other products. Legal wildlife trade is regulated by the United Nations' Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), which currently has 183 member countries called Parties. The world is dealing with an unprecedented spike in illegal wildlife trade, threatening to overturn decades of conservation gains. Ivory estimated to weigh more than 23 metric tons—a figure that represents 2,500 Elephants—was seized in the 13 largest seizures of illegal ivory in 2011. Poaching threatens the loss of our wild Tigers that number around 3,890. Wildlife crime is a big business. Run by dangerous international networks, wildlife and animal parts are trafficked much like illegal drugs and arms. By its very nature, it is almost impossible to obtain reliable figures for the value of illegal wildlife trade. Experts at TRAFFIC, the wild life trade monitoring network, estimate that it runs into hundreds of millions of dollars.

Some examples of illegal wildlife trade are well known, such as poaching of Elephants for ivory and Tigers for their skins and bones. However, countless other species are similarly overexploited, from marine turtles to timber trees. Not all wildlife trade is illegal. Wild plants and animals from tens of thousands of species are caught or harvested from the wild and then sold legitimately as food, pets, ornamental plants, leather, tourist ornaments and medicine.

Wildlife trade escalates into a crisis when an increasing proportion is illegal and unsustainable—directly threatening the survival of many species in the wild.

In the early 1990s, TRAFFIC estimated the value of legal wildlife products imported globally was around USD160 billion. In 2009, the estimated value of global imports was over USD 323 billion. TRAFFIC estimated the legal trade of wildlife products into the EU alone was worth an estimated €93 billion in 2005, and this increased to nearly €100 billion in 2009 and it is expected to spiral further unless appropriate checks are made by the officials concerned.

By its very nature, it is almost impossible to obtain reliable figures for the value of illegal wildlife trade, but the figure must run into hundreds of millions (US billions) of dollars. The value of illegal, unreported and unregulated (IUU) fisheries alone has been estimated as between USD 10-23 billion per year (MRAG and FERR, 2008), while the value of the illegal international timber trade has been estimated as USD 7 billion per year, and the illegal wildlife trade, excluding timber and fisheries as USD 7.8-10 billion per year (http:// www.traffic.org/ trade/).

As human populations have grown, so has the demand for wildlife. People in many countries are accustomed to a lifestyle which fuels demand for wildlife. They expect access to a variety of sea foods, leather goods, timbers, medicinal ingredients and textiles. At the other end, extreme poverty means some people see wildlife as valuable barter for trade.

Table 10. *Details of Wild Life Trade Possibilities across the Nations*

Species	Body Parts	Equivalent of One Animal	Estimated Population	IUCN Status	Trade Uses	Traded Countries
Elephant	Tusk	Pair of Tusks (<15 Kgs)	21000 - 25000	Endangered	Ivory Articles; Jewelry; Signature Stamps	Japan, China, Thailand, Singapore, Philippines, European Countries, USA
Rhino	Horn	One Horn	1800 - 2000	Vulnerable	Rings; Dagger Handles; Lucky Stone; Cutlery to detect Poison	Yemen, Hong Kong, China, South Korea, Japan
Tibetan Antelope	Wool	125 to 150 Gram Wool; One Shawl (375-400 Gram Wool)	Less than 75000	Endangered	Shawl	UK, USA, France, Switzerland, Australia, Hong Kong, Thailand, India
Tiger	All Body Parts	Bone-15 Kgs, Claws-18, Teeth-10, Paws – 4	1400	Endangered	Trophy, Pet, Aphrodisiac	China, Thailand, Hong Kong, Taiwan, USA, South Korea
Panther	All Body Parts	Bone-07 Kgs, Claws-18	6000 - 8000	Low Risk	Trophy	China, Thailand, Hong Kong, Singapore, African Countries
Sloth Bear	Gall Bladder, Bile Extract, Bile Salt, Skin	One Gall Bladder	7000 - 9000	Vulnerable	Aphrodisiac, Medicine, Trophy	China, India, Thailand, Indonesia

(Source: T. Sekar, 2017)

So far, we have discussed the erection of sensor to detect the wild animal intrusion to non-forest environments and blaming totally on the wild animals that it had affected the human in many ways. The human interruption caused to the wild animals has to be corrected first. Invasion of human by way of checking the corridors of Elephants; their reserve zone has been occupied with estates, industries and huts; their perennial streams have been diverted and the source has been checked and arrested by erecting the buildings. Such unscrupulous, unplanned, environment unfriendly activities of human either in the form of political or social or economic and everything should be checked with the ecological and environmental perspective and then only any developmental initiatives should be made in the reserve forest environment. In this respect, any intrusion by human during nocturnal hours should be detected with scanner cum camera trap with an alarm to the top planners and the managers of the Tiger Reserve during the periphery of the forest floor through a wireless mode of detection. Currently, through poaching some of the products are taken in an unauthorized way and detecting the trade secrets are really a cumbersome process. Amidst these, let us discuss the possibilities of wild life product trade and scope of marketing available in various countries other than India.

Rhino horn, Elephant ivory and Tiger products continued to command high prices among consumers, especially in Asia. In Vietnam, the recent myth that Rhino horn can cure cancer has led to massive poaching in South Africa and pushed the price of rhino horn to rival gold. Since the Rhino population in the country is estimated to be only to the level of 1800 to 2000 in numbers (Table 10), it is designated as "Vulnerable" and hence one has to take urgent and action oriented measure to protect the Rhinos. Similarly, Sloth Bear is also designated as "Vulnerable" and the Tiger and the Elephants are in the "Endangered" List. Hence, these animals have to be protected and their breeding should be enhanced by providing appropriate infrastructure. The Veterinarians role and their appointment in the Reserves should be

mandatory to regulate breeding and health issues periodically.

Corruption, toothless laws, weak judicial systems and light sentences allow criminal networks to keep plundering wildlife with little regard to consequences. These factors make illegal wildlife trade a low risk business with high returns. The poachers—often poor locals—are the usually the only ones caught, leaving the real masterminds and their network safe and operational with the ability to strike again.

There are certain places in the world where wild life trade is particularly threatening. These areas are called as "Wild Life Hotspots". They include China's International borders, trade hubs in East / Southern Africa and Southeast Asia, The eastern borders of the European Union, some markets in Mexico, parts of the Caribbean, parts of Indonesia and Papua New Guinea, and the Solomon Islands. While these hotspots might be trouble areas at present, they also offer opportunities for great conservation success, if action and funds are well-focused. Wild Life trade alone is a major threat to some species, but its impact is frequently made worse by habitat loss and other pressures.

However, The UK Government has made a clear commitment to support efforts to tackle the illegal wildlife trade. But although there are a few examples of excellent practice and of more recent initiatives – such as better collaborative work between Governments, targeted crackdowns, and awareness campaigns – enforcement remains marginalized and under resourced.

Relying on enforcement is also problematic as crimes involving wildlife are generally not seen as "serious", or are not thought of as "real crimes". And in this way, offenders are rarely identified and prosecuted. Sentencing in the UK, and elsewhere, is also often far too lenient (www.independent.co.uk).These types of crimes, as well as impacting individual animals, affect entire species and biodiversity. They can also lead to the introduction of invasive species and diseases, as well as causing legal and sustainable trade to suffer. It is also believed that some illegal wildlife trade is linked to organized crime. Clearly, when these types of cases do go to court, the impact of the crime should not just be assessed from "market value". In this respect, the supreme court of the nation should be given awareness, importance and impact of the produce on the environment and value realization etc. need to be aware off through organized programs to the honorable court. So that the actual problem could be infused and the impact of the same could be extended to the poor animals.

Factors Influencing Man-Animal Conflicts

Man-animal conflict often results not because animals encroach human territories but viceversa. Often, man thinks otherwise, because man's thinking is rooted in anthropocentrism. Here, the discussion is about the human-animal conflicts of endangered species. The species are endangered not because of natural causes alone but because man failed to preserve and protect them, the attitude was destructive, for pleasure and gain. Often, it is said such conflicts is due to human population growth, land use transformation, species habitat loss, degradation and fragmentation, increase in eco-tourism, access to natural reserves, increase in livestock population, etc. Proper management practices have to be accepted, like conservation education for local population, resettlement of villages, curbing grazing by livestock and domestic animals in forests, etc., including prey-preservation for the wild animals. Provision for availability of natural water, less or no disturbance from the tourists has to be assured. State also has to take steps to remove encroachments and, if necessary, can also cancel the Patta already granted and initiate acquisition proceedings to preserve and protect wildlife and its corridors.

Areas outside protected areas is reported to have the maximum number of man- animal conflicts, they fall prey to poachers easily, and often invite ire of the cultivators when they cause damage to their crops. These issues have to be scientifically managed so as to preserve and protect the endangered species, like wild buffalo and other species included in Schedule 1 Part 1 of the Wildlife Protection Act, as well as other species which face extinction.

In India, human-wildlife conflicts have given rise to many problems like the conservation of wildlife, and livestock, damage to crops and property of farmers. The conflict can be reduced by providing adequate habitat to wild animals and maintenance of physical barriers to wild animals, active guarding of crops and stopping of degradation of habitat quality, providing adequate and immediate compensation to affected families. More development activity causes more interference in forest and the privacy of wild life. These ultimately cause conflict with wildlife. In this respect, the forests has to be left undisturbed. Any developments to

be initiated as part of state or central scheme, the same has to be implemented only in the forest fringes where scrub jungle are available and the same can be examined for development.

However, in the Anamalai Tiger Reserve, the factors actually contributing to the conflicts are drawn from the respondents and the same are presented in Table 11.

Table 11. *Factors Influencing Man-Animal Conflicts in Tamil Nadu*

Sl. No	Influencing Factors	Multiple Response from Respondents	Percentage
1	Elephant Corridor Damage due to unscrupulous Development of Tea Estates	14	93.33
2	Destruction of Evergreen Forests for Plantation Crops	10	66.67
3	Grazing of Small Ruminants and Local Cattle Population in the forest floor and Destruction of Grazing Lands for other uses	08	53.33
4	Laborers working in the Tea Estates are Unaware on the Nature of Tiger Reserve	06	40.00
5	Absence of Bathing and Toiletry Requirements within the Institutions / Tea Estates	04	26.67
6	Deposit of Animal Wastes in the Undefined Environments	09	60.00
7	Cultivation of Wild Animal Friendly Crops in the Estate Premises	05	33.33
8	Untimely Movement of Human for Necessities	03	20.00

Table 11 revealed the causative factors for the conflicts which are happened in the Anamalai Tiger Reserve. There were few factors which are seriously affecting the wild animals and few factors are manageable by the authorities concerned. Among the eight factors taken into analysis, the elephant corridor damage was found to be the acute problem for such conflicts. Because of the increased population, unauthorized occupation, unscrupulous, unplanned construction and visionless land use caused blockage of corridors of Elephants and hence the diversion of Elephants from its regular routes for want of food, water and for breeding. These are quite naturally affected because of blockage of corridor and the animals let migrate to non-forest and forest fringes.

The Second important factor is Destruction of Forests for establishing plantation crops like Tea, Coffee, Rubber and Cocoa; Change in the land use for industrialization and erection of roads. Destruction of forests for all these causes disturbed the animals to the core and it wanders where to move in search of food, water and breeding needs due to habitat destruction. Hence entire blame is on the literate human who turned educated illiterate by way of his actions for personal benefits are the main causes for conflicts. Besides, unauthorized occupation of forest areas adjacent to estates which are to be seriously checked and relieved from their clutches.

Thirdly, the broiler and meat retail outlets and the production units deposit the dead birds and the remains of poultry and meat in the forest floor near to their residential accommodation which quite naturally attracted the wild animal friends to the zone. During that time, the movements of human and other domesticated animals were lifted by the wild animals causing to death. It is actually the human induced death which should not attract any compensation to be paid by the forest department.

The fourth factor is issuance of license to small ruminants and domesticated cattle for grazing permits inside the forest floor which caused the destruction of the vegetation which are to be consumed by the Elephants and Deer population in the Tiger Reserve. Though the Tiger Reserve is not permitting such license officially, the animals are let into the forest floor for grazing and the same should be thoroughly checked and regeneration should be permitted by removing the weed plants in the forest floor.

The fifth important factor in the view of foresters is that the laborers working in the tea estate, tea factories and the residential households are mostly unaware about the Tiger Reserve like the Tribes living in the locality. The tribes used to detect the animal movement by way of its smell; scats of the animal; footprint of the animal etc. very well when compared to the common public and migrated labor from different states to the Tiger Reserve. Hence, it is important for the staff members of the Tiger Reserve or the Forest Department to

initiate an awareness creation training about the wild animals and precautionary measures to be taken by the common public in a phased manner. This factor was reported by 40 per cent of the respondents. Though it is reported by very few respondents, the importance of the factor gained more weightage. If awareness is properly created, most of the conflicts could have been avoided. In an attempt to create awareness among the stakeholders and the common public, the Coimbatore Forest Circle has initiated pioneering effort to create awareness on the wild life movement focusing Elephants in the ranges of Coimbatore, Madukkarai, Boluvampatti, Periyanaickenpalayam, Karamadai, Mettupalayam and Sirumugai through the scheme on Elephant Conservation and Management. Through this erection of powerful camera even to diagnose the elephant in and around 2 KMs radius. On doing so, the information could easily be passed on to the stakeholders and the common public to avoid any untoward incidents due to Elephants (Dina Thanthi, 2018).

Similar to this, whether Anamalai Tiger Reserve is operating with any schemes to avoid the man-animal conflicts and their details are analyzed and the results are presented in Table 12.

Table 12. *Details of Schemes Available to Protect Wild Animals in the Reserve*

Sl. No	Schemes to Protect Wild Animals	Quantity / Units
1	Erection of Elephant Proof Trench	40 KMs
2	Erection of Battery Operated Electric Fence	130 KMs
3	Establishment of Elephant Squad	02 Numbers
4	SMS Message to the Residents about Elephant Movement	2 KMs
5	Establishment of Mobile Squad to Caution about the Animal Movement	02 Units
6	Erection of Elephant Alert Indicators in Principal Spots	12
7	Erection of Drinking Water Facility in the Reserve Forest	19
8	Erection / Cultivation of Fodder Plants / Weeding the invasive Species to promote native fodder species for the benefit of Elephants and Deer	223 Sq. KMs

Table 12 revealed the details of schemes in vogue with the Anamalai Tiger Reserve to mitigate the man-animal conflicts. In that erection of elephant proof trench is one of the principal effort to mitigate the Elephants. The elephant proof trench is erected in the ATR to the level of 40 KMs distance in the reserve. Besides, the battery operated electric fence to provide electric shock in the form of pulse is carried out in 130 KMs distance. In addition to this, elephant mobile squad has also been constituted to monitor and communicate the movement of animals to the common public and to keep the Elephants or the animals within the Tiger Reserve and also the ATR is passing short message service about the elephant movement to the common public whom are residing in 2 KMs radius of ATR.

Erection of Elephant alert indicators in 12 locations and the drinking water facility to the wild animals in 19 locations have been established in the ATR. However, in Coimbatore Forest Circle, it has been planned to establish 105 water tubs for the benefit of Wild animals during the year 2018. (Daily Thanthi, 2018). Another important issue is preoccupation of weed plants in the forest floor which hinders the growth of fodder plants for the benefit of Elephants and Deer population and hence special effort has been taken to de - weed the weed plants in the forest floor in an area of 223 square KMs. With all these efforts and careful monitoring, one can minimize the conflicts between the human and the animals.

However, the conflicts minimization not only rests with the above schemes, but also some of the peculiar strategies which are observed to be less important but at the same time results in mitigation of human-animal conflicts in the forest floor in a bigger way on its implementation effectively to combat the same in Totality. These are analyzed and the results are presented in Table 13.

Strategies to Combat Man-Animal Conflicts

There were many strategies which are implemented on trial and error basis to combat the man animal conflicts. Few are successful for some time and the animals after some time learned to violate the measures taken by the human being. Hence, revisiting of strategies are needed often to combat the conflicts. Table 13 has prescribed few of such strategies erected or to be erected in the ATR for the peaceful living of animals and the human being.

Table 13. *Strategies to Combat Man-Animal Conflicts in the Wilder Zone of ATR*

Sl. No	Strategies Needed
01	Elephant Corridor has to be acquired from the Occupants of both Private and Government Bodies
02	Over-bridge Facility for Animal Movement from one Corridor to Another
03	Establishment of Fodder Bank / Plantations and Water holes for the animals
04	Tightening the Patrolling Team and Monitoring the Same through Vigilance
05	Erection of Street Lights in the Residential and Estate Roads
06	Establishment of Mobile Ration Shops and their Feasibility
07	Clearing of Bushes and Tea Plants in Ten Meter Radius along the Residential Areas and Roads
08	Provision of Life Insurance Cover to the Employees by the Industries / Tea Estates
09	Provision of Closed Vehicle Facility to the Wards of Employees of Tea Estates
10	Safe Disposal of Remains of Meat Shops to avoid inflow of Carnivores
11	Rearing of Animals like Goats, Dogs, Cats, Poultry should be prohibited
12	Rearing of Milch Animals should be in an Iron Fence with a way to move from inside the house
13	Playing of Children in an unprotected environment should be avoided
14	Cultivation of Banana Trees in the Residential Environment will attract Elephants and hence the same may be avoided

In Table 13 has highlighted 14 strategies to halt the man-animal encounters either in the forest fringes or inside the forests. Among the 14 strategies, the first three are found to be very much important in the context of protecting the animals and the human safely.

The First one being blockage of animal corridors. Animals used to go by their own traditional routes for all their basic needs like food, water and breeding. But the corridor has been blocked either by the Government institutions or by the private institutions which are either known to the Government or unauthorized occupation of the forests without knowing that it is the corridor for the wild animals. Because of the blockage, the animal movement has been impaired and hence the corridor has to be identified by the team exclusively constituted by the Government and that team or the Committee should be an Empowered Committee so that the acquisition is possible and can be made free to facilitate the movement of animals.

The Second Strategy is the forest area has been acquired for road and transportation network. Because of the rushing vehicles inside the forests, many of the wild animals face accidents during the night hours and in the day time. To avoid the unnecessary deaths of the animals, wherever, the road network crosses the corridor of animals, erection of over bridge in the forest areas are must for the easy movement of wild animals. These measures have been erected in developed nations' forests considering they are also the lives and their importance in enriching biodiversity. Here, in India, the animals and other creatures are left uncared and so to say least importance is given in the plan allocations.

The Third important strategy is provision or erecting or establishment of fodder plantations or fodder banks for the feeding of wild animals in the forests during the summer months specifically. During that time, water scarcity will be acute and hence the flowing river water from power generation units have to be blocked and erected as water holes or ponds for continuous supply of water so that the animals would bless the human for their actions.

Other Strategies like erection of street lights in the residential as well as estate roads become more important and the clearing of sides of the roads to the width of 10 meters at least to avoid hiding of animals for attack on human being. In this respect, clearing of Tea bushes along the road and the estate roads becomes important.

Taking the staff members to the tea industries or to the estates for employment in a closed vehicle so that the attack by the carnivores could be minimized. In addition to this, provision of insurance cover to the employees are also vital that should be provided by the tea estates and tea factories under group insurance program for life saving.

Currently, the stationary ration shop contains food materials are ransacked by the Elephants for its food and other requirements and hence the revenue officials should revisit the ration shop in the form of a mobile one to cater the needs of poor households in the ATR so that the damage of ration shop could be minimized.

Improvement of Habitat

It is the duty of Ministry of Environment, Forests and Climate Change to provide assistance to State Governments for improvement of habitat to augment food and water availability and to

minimize the animal movement from the forests to the habitations.

Training and Awareness Programs

To address the problems of human- wildlife conflict it is essential to train the police officers and local people. It is the duty of forest department to frame the guidelines for management of human-animal conflicts and publish the same in the local community.

Technical and Financial Support

Providing technical and financial support for development of necessary infrastructure and support facilities for immobilization of problematic animals through tranquilization, their translocation to the rescue centers or release back to the natural habitats.

Boundary Walls

Providing assistance to State Governments for construction of boundary walls and solar fences around the sensitive areas to prevent the wild animal attacks.

Eco-Development Activities

Providing assistance to the State Governments for eco-development activities in villages around Protected Areas to elicit cooperation of local community in management of the Protected Areas.

Encouraging and supporting involvement of the research and academic institutions and leading voluntary organizations having expertise in managing human -wildlife conflict situations.

Erection of Bio Walls by Save the Elephants

Save the Elephants (STE) is a UK registered charity based in Kenya founded in September 1993 by Lain Douglas-Hamilton Save the Elephants works to sustain elephant populations and preserve the habitats in which Elephants are found, while at the same time fostering a heightened appreciation and visibility for Elephants and their often fragile existence. The organization uses a four pillar approach to fulfill its mission statement, combining habitat protection, research, grass roots organization and involvement, and through disseminating information through television, films, publications and new media sources.

Save the Elephants has been instrumental in helping to revitalize African Elephant populations, while at the same time, increasing awareness in the many issues which threaten to erode elephant populations and the habitats in which they live. Lain Douglas Hamilton has played an integral role in stopping the illegal ivory trade throughout the world, while at the same time raising the profile of elephant conservation and awareness.

The research effort of one employee of STE named “Lucie E King” has invented Honey bee (Bio) wall to combat the Elephants. This has been tested in Kenya and several other places. On seeing the honey bees and their voice, the Elephants have avoided the particular route to browse the farm fields. In India, this has been tested in Karnataka (Canara District) and Kerala (Vayanadu District) by erecting honey bee fence and found that the honey bee fence is very effective (The Hindu, 2018) and hence Tamil Nadu can also explore the successfulness of Honey Bee Fence erected in Kerala and Karnataka and the same may be transformed to Tamil Nadu for effective protection of Elephants. However, experts express their opinion that the honey bee bio wall is location specific and are most successful in Kenya. But it is not much effective in Indian Terrain as the behaviors of Asian Elephants are different. To redress the mixed opinion, a research study by the renowned institution is the need of the hour.

SUMMARY

Man – Animal Encounters are increasing day by day in different territorial forest divisions. Many death events are taking place both in human and the wild animals. These are not news but an environmental degradation that leads to ecological problems and if left to continue unchecked, some vital species will become extinct and the rejuvenation becomes problem. In this respect, the wild animal movements are to be carefully watched, needs have to be identified and the needs are to be fulfilled in the virgin forest environment. The death to wild animals are happening because of the poaching activities initiated by the human due to attractive trade in wild life products either in the forest floor or in the forest fringes are to be severely controlled by the monitoring and investigation team of Forest Department by enforcing the law scrupulously. The environmental, social and political threats are to be categorized and are to be managed appropriately by coining suitable strategies to minimize the conflicts.

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