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Status of elephant corridors in Tamil Nadu

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Abstract

The study was carried out in Coimbatore Forest Circle because of frequent Man-Animal Conflicts occurred in recent years by following a mixed sampling approach. The most commonly assumed distinguishing characteristic of a corridor is its function as a linear landscape element to facilitate species movement. Tamil Nadu is the major stakeholder state in the project elephant. It has 5 elephant sanctuaries covering 7940 sq.km with 6776 elephants were enumerated in 2005, 19 elephant corridors and 4 interstate corridors linking to elephant sanctuaries in Karnataka. In India 88 elephant corridors were identified as being currently in use by the elephants across the elephant reserve areas. Of these, 12 are in North Western India, 20 in Central India, 14 in North West Bengal, 22 in North-Eastern India and 20 in South India. Among these corridors, the elephants are using around 77 per cent of the corridors. Based on Standard Analysis (SA) about one third are of ecologically high priority and 67 per cent are of medium importance. To document the fact sheets of the corridors, a sample plot was chosen covering an area of 0.25 acre and the tree species available in the plot were recorded to highlight the food species of elephants and the obstacles established in the corridor were also identified. School buildings, Ashrams, Research Institutions of State and Central Government were the obstacles besides establishment of private plantations adjacent to the corridor. As per the norms, two chain length of the land space from reserve forest zone should be freely available to avoid the animal entry into the human habitations. But the two chain length space has been illegally occupied and made into Patta lands and established private plantations of commercial importance and hence these lands have to be secured by the Forest Department under the head of conservation plan to make the corridors free from encroachment.

Keywords: Man-Animal conflicts, elephant corridors, fact sheets

1. Introduction

India is home to around 60 per cent of Asia's wild elephants. The requirements of food and water to the elephants are very high and therefore their population can be supported only by forests under optimal living conditions. The status of elephant can be the best indicator of the status of the forests in India. Managing Human – wildlife conflict is a greatest challenges of conservation agencies in India. Across the world, it is generally accepted that conflict erode public support and builds animosity against wildlife conservation (Madhusudan, 2003) [1]. Similar chronic conflict has profound impact on wildlife and their habitat. It will degrade the wildlife at species, population, and individual through process of extinction. Tamil Nadu is the major stakeholder state in the project elephant. It has 5 elephant sanctuaries covering 7940 sq.km with 6776 elephants were enumerated in 2005, 20 elephant corridors and 4 interstate corridors linking to elephant sanctuaries in Karnataka. There are 14 divisions under the Forest Department of Government of Tamil Nadu caring elephant protection and welfare of elephants. Human-Elephant Conflict (HEC) is increasing now-a-days because of less punishment awarded to the Poachers and attractive price offered in the Ivory markets abroad. For these two reasons, the elephant hunting is found to be increasing. The HEC is happening not only due to poaching but also the activity of crop raiding and crop damage in the farm lands because of absence of required fodder crops in the forest territory and the water for its requirement. The Human wildlife conflict is also backed by many factors such as growth in the human population and increased consumption of natural resources from forest viz. fruits, fibre, fodder, floss, fuel and flesh (6Fs) as cheaper in cost and hence the common public are trying to take as much as possible from the forest in the absence of protection of forest in the human habitation. Another factor is establishment of animal loving crops in the forest fringes like Banana, Sugarcane etc. Habitat loss and fragmentation to the elephants and the unauthorized erection of buildings of religious nature and schools in the elephant corridors were forced the elephants to cross migrate to the human habitations.

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Crop damage is a major problem in the farm lands adjacent to wildlife corridors. Bell (1984) [4] reported that the crop damage is prevalent mostly in the boundary of the forest and it does not move into the distant locations for its food. Similar results were observed in the study conducted by Hawkes (1991). The elephant herds are known to migrate across 350 – 500 square kilometres annually but increasingly fragmented landscapes are driving the giant animals more frequently into human dominated areas giving rise to more man-animal conflicts (S.S. Singh, 2017) [3]. In this situation, maintaining the elephant corridors which are enriched with food species are therefore important to both elephant and human habitations. In this regard, a study has been initiated to address the nature of the corridors and its functionality in the study environment. World trust fund, International fund for Animal Welfare (2003) systematically assessed and prioritized the 88 elephant corridors across India to acknowledge the human population about the blockages they have made and make them aware not to do defend the natural passage. Conserving wildlife corridors is increasingly important for maintaining ecological and genetic connectivity in times of unprecedented habitat fragmentation. Documenting connectivity loss, assessing root causes, and exploring restoration options are therefore priority conservation goals. (Trevor Jones, 2012) [2]. Against this backdrop the present study was designed to study the elephant corridors in Tamil Nadu.

2. Materials and Methodology

The sampling design followed in this study was a multi-stage purposive sampling. Coimbatore Forest Circle comprises of Territorial Forest Division, Wild life division and the Territorial region in the hills of Nilgiris and hence Coimbatore Forest Circle was chosen purposively in the First Stage. Coimbatore Forest Circle encompasses three forest divisions and from each forest division one forest range was selected in the second stage *viz.*, Pollachi forest range was selected purposively as it is nearer to the study environment even though it had lesser area under forest when compared to other ranges but it faces with higher man animal conflicts; Bolampatty forest range was selected as it had the highest area under the forest range in the Coimbatore Forest Division and the Coonoor Forest Range was selected in the Nilgiris North Division in the second stage. In each of the forest range the following sampling units were chosen as the ultimate sampling units in the third stage. The details of selection of samples were presented in Table 2.1.

The forest cover of elephant habitats, including terrain/contours (using the Google maps and Google earth) was reviewed to understand the current status of the elephant habitat at the time. In order to verify all the corridors in detail, field surveys were conducted discussions with the officials of relevant state forest departments, forest field staff, knowledgeable members of NGOs and individuals, before personally visiting the corridors. Information on the functionality or usage of corridors by elephants was collected from frontline forest department staff, secondary surveys from local villagers (present and past usage of corridors by elephants in the region), and direct surveys for usage by elephants, and discussions with local researchers, and published literature. Details such as GPS locations, the parameters of the corridor, habitations, land use status, human artefacts, threats, and socio-economic details were collected based on which a conservation plan was prepared for each corridor.

Table 1: Details of Samples Selected from Coimbatore Forest Circle

S. No	Details of Sampling Units	Number of Samples	Percentage to Total
01	Farmers	60	42.86
02	Tribes	60	42.86
03	Forest Officials	06	04.29
04	Non-Governmental Organizations Relevant to Wildlife Conservation and Management	03	02.14
05	Scientists involved in Wildlife Management	05	03.57
06	Veterinary Physician	03	02.14
07	Wildlife Biologist	03	02.14
Total Number of Sampling Units		140	100.00

As outlined in Table 2.1 the researcher has chosen 140 samples in the study area which comprises of farmers, tribes, forest officials, Non-Governmental Organizations, scientists working in the wild life institutions, veterinarian and the biologists. Among these, the farmers and tribes were respectively accounted for 42.86 per cent to the total samples selected for the study as they were the affected personnel and hence priority in sampling was given. Others were interviewed for their opinion related to Man-animal conflicts.

2.1 The fact sheet of the corridors

The fact sheet is just like a questionnaire designed for the information seeking from the households like farmers and tribes. The compositions of information in the fact sheet are highlighted for better understanding of the readers. The rationale behind the fact sheet is furnished as follows.

- **Name of the Corridor:** Normally the corridors have been given the name of the place in which it starts and the place in which it ends. If the corridor was given any other name according to the experts, it was also documented.
- **Ecological Priority:** some of the forest stretch is blessed with different vegetations which are most preferable to the elephants and hence the elephant may rely on the corridor most often and hence the corridors have been classified into high priority or most often used; medium priority and low priority. Percentage analysis will be done to learn the most priority corridors.
- **Conservation Feasibility:** Besides ecological priority, the corridors were also graded on conservation feasibility with focus on land ownership, number of human settlements, and fragmentation of the corridor.
- **State:** The corridor which extends from one state to another state in the country are also examined and documented.
- **Forest Division:** The corridor may extend from one division to another forest division and hence the details of corridor by which it extends to other divisions were also examined and documented.
- **Connectivity of the Corridor:** The two elephant habitat that were connected by the specific corridor and its details were also documented.
- **Geographical Coordinates:** The details of geographical coordinates and its position will be examined by using GPS approximately at two ends of the corridor.
- **Length and Width of the Corridor:** Length and breadth of the corridor is also documented. Here length denotes the distance between two habitats in the direction of elephant movement. Width is the distance of separation at

the two closest points. Both are measured in Kilometres.

- **Forest Types and Vegetation:** The type of vegetation present within the corridor area using the reference of vegetation types as enshrined in Champion and Seth classification (1964). The sample area chosen in each corridor was 0.25 acre of land and the details of tree species available were enumerated and documented to assess the food species of elephants.
- **Nearest Protected Area:** it denotes the proximity of any protected area. It may be a national park or sanctuary through which the corridor passes were also noted. The sample area chosen in each corridor was optimized at 0.25 acres of land and the details of tree species available were enumerated and documented to assess the food species of elephants.
- **Legal Status of the Corridor:** It denotes the status of the land in the corridor area viz., National Park; Wildlife Sanctuary; Reserve Forest; Revenue Land; Community Forest Areas; Private Land or Property etc.
- **Type of Land Use:** it examines the details of land use prevailed in the corridor that passes through which examines the farm lands, tribal settlements, tea estates, details of villages available, man-made structures like buildings, reservoirs, power generation units etc.
- **Frequency of Usage of the Corridors:** the usage of the corridors by the elephants were classified as Regular, Seasonal and Rare based on its periodicity of visits.
- **Number of Elephants Using the Corridor:** on an annual basis approximately how many elephants are using the corridor is reported.
- **Threats to the Corridors:** Here, the possible threats like hunting, poaching etc. are documented and reported.
- **Conservation Plan:** It addresses the plan of conservation, type of actions performed and its acceptance by the elephant or any damages, proposed actions to protect the corridors were also discussed and documented.

The information spelt above as part of the fact sheet which are thoroughly discussed with the respective respondents and the details are documented in the fact sheet and are suitably be analysed and discussed to draw the results.

2.2 Methods of Collection of Data

The study uses both primary and secondary data to meet the requirements of the objectives. Primary data required for the study was collected from the sample farms and tribes through personal interview method with the help of a comprehensive well structured, pre-tested interview schedules, bearing questions in relation to the objectives enshrined in the study. The secondary data required for the study like location of the study area, demography, rainfall pattern, land use pattern, irrigation sources, cropping pattern practiced in the forest fringes, type of attacks by the wild animals and the compensation received by the respondents etc. from the

department of forests, department of agriculture and from the department of economics and statistics located in the Coimbatore district headquarters. The data collected using the fact sheet of the corridors from experts, Forest Department personnel and tribes were analysed and the meaningful conclusions were drawn.

3. Results and Discussion

The results with respect to analysis of Corridors in Tamil Nadu with special reference to Coimbatore Forest Circle (CFC) were analysed using the fact sheet developed for that purpose.

3.1 Major elephant corridors in Coimbatore forest circle

Corridor is the path used by the elephant for migration from one place to another to meet their food, water and the reproductive requirements. These were analysed by developing a fact sheet as discussed in the methodology section. The fact sheet has been administered with the experts belonged to the Forest Department, Non-Governmental Organizations and the Scientists involved in Elephant research and monitoring. The facts were documented for individual corridors and the details were presented corridor wise. Though there were 20 corridors in Tamil Nadu, around 12 could be visualized from Coimbatore Forest Circle.

3.1.1 Jaccanaire slope to hulikkal durgam corridor

This elephant corridor connects the Jaccanaire Slope reserve forest and Hulikkal Durgam Reserve Forest of Coimbatore Forest Division. The elephants from Sathyamanagalam Tiger Reserve moves to Southern part of Coimbatore forest division through the foot hills of highly undulated mountains and cross the corridor between the second hair-pin bend of Mettupalayam – Coonoor highway and Kallar village. The corridor is very narrow due to plantations and various man made developmental initiatives like establishment of Arecanut Plantations, Banana Plantations which are the crops dearer to the elephant. The details of Jaccanaire to Hulikkal Durgam corridor which is otherwise called as Kallar at Ghanda pallam corridor. It connects Sathyamanagalam Tiger Reserve and the Coimbatore Forest Division. The length of the corridor runs up to 7 kilometres and the width of the corridor extends up to 300 meters. The forest types prevalent in the corridor is Tropical Thorn and Dry Deciduous Forests which encompasses a total of 27 tree species which are sampled in 0.25 acre area spread. The dominant tree species available in the belt are *Ficus benghalensis*; *Azadirachta indica*; *Albizia amara*; *Acacia nilotica* and the *Bamboo* species. Because of the human invasion, most of the tree canopies were cut and fed to the livestock population by head loads and hence almost all these species are appearing pruned heavily. In this corridor, the elephant loving species like Bamboo are not well flourishing due to poor rainfall and unauthorized removal of clumps for the Basket making activities by the local residents and to the basket weavers located nearby.

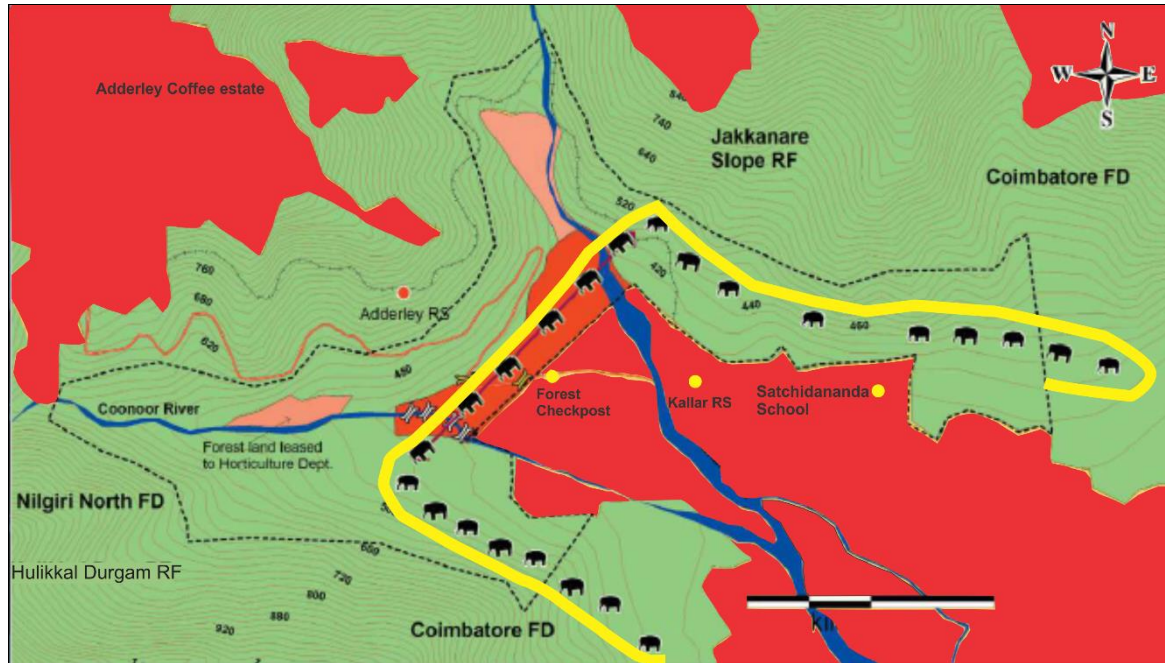


Plate 1: Elephant Migration in Jaccanare Slope to Hulikkal Durgam Corridor

In this corridor, one could observe the threats to the elephants are the presence of Swami Sachidhanandha Jyothi Niketan School and the Presence of Black Thunder, the water theme park which are positioned across the corridor of the elephants which affects the migration of the elephants. Besides, these buildings and theme parks were provided with solar operated power fence and hence the elephants have been forced to move out of the scene. When it moves to alternate route in the slope, one could visualize the establishment of Arecanut plantations and Banana plantations which are once occupied in an unauthorized manner. The politically powered people were occupying these floors and thereby the elephants were unable to get a space for feeding and free moving.

3.1.2 Anaikatti north to anaikatti south corridor

This corridor connects Anaikatti North Reserve Forest and Anaikatti South Reserve Forest of Coimbatore Forest Division. The elephants from Sathyamangalam Tiger Reserve move to mannarkad Forest Division of Kerala through the foot hills of highly undulated mountains in the upper plateau of Coimbatore division and cross the corridor near Panappalli, Kondanur pudur, Kuttuppuli and Anaikatti villages around. This corridor inhabits 32 tree species which were identified in the area spread of 0.25 acre spread. Of these 32 tree species, 18 were palatable food species for the elephants. The principal tree species available are *Acacia planiferons*; *Dichrostachys cinerea*; *Zyziphus mauritiana*; *Azadirachta indica*; *Anogessius latifolia*. The ground cover was occupied with shrubs, grasses, herbs and other foliage.

3.1.3 Avarahalla to sigur corridor

This corridor connects Avarahalla Reserve Forest of Mudumalai Tiger Reserve with Sigur Reserve Forest of Nilgiris North Forest Division. The elephants from Nilgiris North Forest Division to Bandipur Tiger Reserve through Mudumalai Tiger Reserve between Chemmanatham and Mavinahalla villages. This corridor is blessed with 14 important tree species. Of these, four species are palatable food species to elephants. The food species of elephant are *Randia dumetorum*, *Diospyros sp*, *Cardia sp*, *Zyziphus sp*,

Bamboo patches. In this corridor, around 300 elephants are available and making use of the corridor. The forest type available in the corridor is Tropical Thorn Forests. Because of the presence of Bamboo patches, elephants often used to graze in this corridor. The length of the corridor is around one kilometre and the width of the corridor is around half a kilometre.

3.1.4 Kallhatti to sigur corridor at glencorin

This corridor connects the Singara Reserve Forest of Mudumalai Tiger Reserve and Kallhatti Reserve Forest of Nilgiris North Forest Division. Elephants from Nilgiris North Forest Division moves to Mudumalai Tiger Reserve and Bandipur Tiger Reserve through the northern foot hills of Kallhatti Mountains near Glanton Inn hotel at Glencorin. The corridor is blessed with 19 plant species which are identified and documented. Among these, the predominant tree species available in this corridor is *Canthium parviflorum*. The other tree species found in this corridor included are *Acacia chundra*, *Erythroxylon monogynum*, and *Gardenia sp*. All of them are the palatable food species to the elephants. The length of the corridor is less than one kilometre and the width ranges between 100 meters to 300 meters. The forest type prevalent in the forest environment is Tropical Thorn Forests. The threats identified in the corridor is presence of patta lands and the existence of two resorts in the valley and they take their tourist guests for wildlife sighting to the corridor areas throughout the day. Forest Department has an anti-poaching camp in the corridor area which also blocks the unhindered movement of elephants. The resorts have forced the elephants to use the foot hills of Nilgiris.

3.1.5 Moyar to avarahalla corridor

This corridor connects Moyar Reserve Forest and Avarahalla Reserve Forest of Mudumalai Tiger Reserve. Elephants from Nilgiris North Forest Division move to Bandipur Tiger Reserve through the Mudumalai Tiger Reserve between Moyar and the Masinagudi villages. Masinagudi village is very closer to the corridor and most of the time the animals pass through the roads erected near by the villages. The

density of tree species available in the corridor is around 15 per hectare and there were around 36 species of trees available in the corridor. The predominant tree species in this corridor include *Randia dumetorum*, *Canthium parviflorum*, *Acacia chundra*, *Erythroxylon monogynum* and *Gardenia sp.* All these species of trees were palatable food to the elephant population in the locale. Besides, three species of shrubs also much preference to the elephants which are available in plenty. There is a perennial channel running from Masinagudi to Moyar village and two perennial ponds are also located in this corridor. When the wild dogs are chasing the spotted deer for their food, the deer used to jump in the water body and swim along and reach the other bank of the tank where the poachers used to take the animal and pricing the animal for monetary gain. In this circumstance, the Anti-Poaching Squad available with the Forest Department should perform untimely sudden checks in the tank areas to avert the poachers during the early and late hours.

3.1.6 Mudumalai – O' valley – Nilambur corridor

The corridor is located in an inter-state boundary of Tamil Nadu and Kerala connects Nilambur North Forest Division of Kerala and Nilgiris North Forest Division of Tamil Nadu, Gudalur Forest Division and Mudumalai Tiger Reserve. Elephants from Nilambur Forests move to Mudumalai Tiger Reserve and Bandipur Tiger Reserve through the fragmented forest patches, tea, coffee, cardamom estates and human habitations of Gudalur forest division via O' Valley. The length of the corridor is around 35 km and the width of the corridor is around one kilometre. Among the corridors, this corridor found to be the lengthy corridor which connects two states. The forest type prevalent in this corridor is Dry Deciduous and Shola Forests. Major land use prevalent in the corridor is found to be enriched with Tea estates, Coffee Estates, Cardamom Plantations and the human and tribal settlements. The human settlements numbering to around 26 are located in this corridor. Physical obstruction as well as biotic pressure hinders the elephant movement in this corridor. Other threats identified are the plantations like tea, coffee, and cardamom plantations located all along the corridor and some of these are protected by electric or solar powered fences that greatly affect the free movement of elephants. The electric fence erected in Balmadi estate is considerably blocking the elephant movement. Vehicular traffic is another threat because the National Highway 67 connecting Ooty – Bangalore passes through the corridor. An average of 114 vehicles per hour was recorded round the clock on the highway. The human-elephant conflict in the corridor is found to be comparatively higher because of higher traffic and passes. Besides human movement inside the forest for fuel wood and fodder collection and non-timber forest produce collection in an unauthorized way results in human-animal conflicts in a big way. Removal of electric fence erected in the plantations along the corridor need to be removed will in turn facilitate the movement of elephants.

3.1.7 Anamalai at punachi corridor

This corridor connects Punachi Reserve Forest and Anamalai Reserve Forest within Anamalai Tiger Reserve. Elephants from Anamalai Tiger Reserve move to Parambikulam Tiger Reserve through highly undulated forests between the villages of Attakatti, Kilpunachi and Upper Aliyar. The corridor is seasonal and the forest type is found to be Tropical Moist Deciduous Forest. The length of the corridor is found to be

four kilometres and the width of the corridor is ranging between 0.8 to 1.6 kilometres. The elephants use this corridor during the reproductive phase and during the rainy season for availing good fodder. A total of 28 tree species were recorded in the corridor. Out of these, 12 species were found to be palatable food species to the elephants. The species which are abundant and served as food species are *Syzygium cumini*, *Olea dioica*, *Albizia lebbbeck*, *Anogeissus latifolia* and *Grewia tiliiaefolai*. The threats identified are expansion of highway that leads from Pollachi to Valparai. The construction of wall along the road were in progress. The number of vehicles using this corridor is very high especially during the season of migration. The Kilpunachi village is located in the corridor but it is not attracting any human-animal conflicts as the villagers are capable of communicating with the elephants in their own language to control the elephant into the village premises. Besides, the villagers are not raising any elephant loving crops and hence the human-animal conflict is kept at minimal. The conservation plan in vogue with the Forest Department is preventing the developmental activities along the corridor which are hindering elephant movement. The vehicular speed should also be regulated on the Valparai Ghat Road and prevent visitors from stopping. Suitable sign boards have to be erected on the roads to create more awareness among the visitors or tourists.

3.1.8 Anamalai at waterfalls estate corridor

In the Anamalai Tiger Reserve (Forest Division), this is the second corridor that links the habitats of Valparai Range and Pollachi Range. The elephants from Anamalai Tiger Reserve move to Parambikulam Tiger Reserve through the narrow reserve forest between waterfall and Mount Stuart tea estates. This corridor is a regular one in which the animal movement is visible regularly. This corridor is otherwise called as Ayerpadi-Waterfalls estate. The corridor is a regular one in which the animal movement is regular and the corridor is blessed with 30 tree species. Out of which three species are dearer to the elephants and the forest type is Tropical Moist Deciduous Forests. The legal status of the forest is a Tiger Reserve and it has forest leased-in land. The length of the corridor extends to 7.50 kilometres and the width of the corridor is ranging between 0.17 to 1.80 kilometres. The predominant species identified are *Cullenia exarillata*, *Syzygium cumini*, *Wrightia tinctoria* and *litsea wightiana*. The threats identified in the corridor were heavy tourists; existence of labor colony and heavy vehicular traffic. The heavy inflow of tourists affects the animal movement and hence Human-Elephant conflict becomes common in the corridor. The biotic pressure from the labor colonies of Waterfall estate and Mount Stuart Estate area becomes a threat to the corridor. Another disturbance is vehicular traffic. Per hour, on an average around 52 vehicles are moving between Pollachi-Valparai Road. Human-Elephant conflict is a major issue in Anamalai. The intensity of elephants killing people and damaging property increases during the month of August to February. Several deaths have been reported and the details of deaths were discussed in the ensuing section. The conservation plan that exists with the Forest Department is prevention of encroachment by the villages for crop production and tea estate expansion related activities. Another major issue is securing the land encroached or owned by the estate owners in the corridor has to be retrieved. The regular vehicular traffic should be regulated by erecting speed control devices in the stretch that extends between Valparai estate and the Pollachi road.

3.1.9 Anamalai-siluvaimedu-kadamparai corridor

This is the third corridor that connects the habitats of Valparai Range and Manambolly Range of Anamalai Tiger Reserve. The elephants from Anamalai Tiger Reserve move to Parambikulam Tiger Reserve through highly undulated narrow strip of forests between Mount Stuart estate and Iyerpadi estate. This corridor is also known as Siluvaimedu to Kadamparai Corridor. The length of the corridor that extends to 7 kilometres and the Width of the corridor ranges between 0.5 to 2.70 kilometres. The legal status of the corridor is Tiger Reserve. Major land use practiced is only for Forest related activities. The elephants are very rarely using this corridor. The corridor is blessed with Tropical Moist Deciduous Forest type. In this forest, around 33 tree species were recorded in the sampled area. Out of which, only three species were palatable food species to the elephants. The predominant species available in the area is identified as *Syzygium cumini* and *litsea wightiana*.

3.1.10 Vazhachal-anamalai via sholayar corridor

This corridor connects the Valparai Range and Manambolly Range of Anamalai Tiger Reserve, Tamil Nadu with Malayattur Forest Division, Kerala. This corridor located in an inter-state boundary of Tamil Nadu and Kerala. Elephants from Malayathur forest division and Vazhachal Forest Division, Kerala move to Anamalai Tiger Reserve through TATA Coffee Limited at Pachhamalai, Sirikundra Tea Estates India Limited, Periya Karamalai Tea Company, Parry Agro Industries Limited at Iyerpadi and Pannimedu, Murugan, Korangumudi, Injipara, Sholayar, Kallar, Vellamalai, Nadumalai villages on the Valparai plateau, Tamil Nadu. The alternate name of the corridor is Karumalai-Sholayar. The forest type prevalent in this corridor is Moist Evergreen Forests which are legally protected for Tiger Reserve. The length of the corridor that extends up to 13 Kilometres and the Width of the corridor that ranges between 0.30 to 1.50 Kilometres. The corridor was mainly used during the seasons of migration. The corridor is blessed with around 35 tree species. Among these, only four species were found to be palatable food species to the elephants. The Predominant species available in the corridor were identified as *Canthium dicoccum*, *Salix tetrasperma*, *Manilkara hexandra*, *Haldina cordifolia* and *Cullenia exarillata*. This corridor is blessed with around 25 per cent of herbs which are preferable to the herbivores like elephants and hence these vegetation has to be maintained from erosion due to developmental activities in the corridor. The ecological importance of the corridor is the protected area for the Tiger Reserve and hence any developmental activities in the corridor is banned. The threats identified are the human settlements in the corridor. Labor lines of tea plantation and large number of villages hinders the elephant movement during the season of migration. This corridor has the land use exclusively for tea and coffee plantations along with their labor lines and factories that also hinders the elephant movement. Besides, the corridor has also the estate roads and dam roads that are having heavy vehicular traffic and hence these are to be regulated for free movement of the animals. The conservation plan in vogue with the forest department is prevention of encroachment and delimiting the developmental activities in the Tiger Reserve. Construction in any account is not permitted on both sides of the roads and awareness creation exercise is also there to make aware about the significance of the Tiger Reserve and the Elephant corridors.

3.1.11 Vazhachal-Anamalai via Ryan Corridor

This corridor connects Valparai Range and Manambolly Range of Anamalai Tiger Reserve, Tamil Nadu with Malayattur Forest Division, Kerala. This corridor is located in an inter-state boundary of Tamil Nadu and Kerala. The Elephants from Malayattur Forest Division and Vazhachal Forest Division, Kerala move to Anamalai Tiger Reserve through Ryan Division of Tamil Nadu Tea Plantation Corporation (TANTEA) and 8-10 fragmented rainforest patches. The length of the corridor is around 6 Kilometres and the width of the corridor is around one kilometre. The usage of the corridor by the elephants are found to be regular. The major land use prevalent in the corridor is Tea estates and human settlements. The type of forest prevalent in the corridor is Evergreen forest which inhabits a total of 27 tree species. Out of which around five tree species are palatable food species to the elephant population. The predominant tree species in the corridor were identified as *Canthium dicoccum*, *Cullenia exarillata*, *Haldina cordifolia*, *Strychnos potatorum* and *Salix tetrasperma*. Among the above species, *Strychnos potatorum* and *Haldina cordifolia* were found to have high canopies. In addition to the tree species, the forest floor is blessed with around 20 to 25 per cent of grasses for the grazing of herbivores including elephants. Here, the threats identified are the presence of tea estates; Human settlements; Vehicle Traffic and Corridor dependent villages. The Ryan and Lawson division of Tamil Nadu Tea Plantation Corporation completely bisect the corridor connectivity and poses problems to the elephant movement. The tribal settlements and Tea estate labor colonies are located inside the corridor areas posing a severe threat to the animals. The vehicle traffic between Valparai and High Forests obstructs the free movement of the elephants.

3.1.12 Kalmalai-Singara and avarahalla corridor

This corridor lies between the villages of Singara and Masinagudi on the Northern slopes of Nilgiris hills. It comprises of forests on either side of the road connecting these two villages. The corridor is intensively used by the elephants that seasonally move from Mudumalai Tiger Reserve to the Nilgiris North Forest Division. As movement is not possible along the Nilgiris slopes, the corridor is of great significance. A total of 42 tree species were identified and reported. The predominant tree species present in this corridor were *Anogeissus latifolia*; *Randia dumetorum*; *Zyziphus xylopyrus* and *Erythroxylon monogynum* etc. The overall tree density was estimated at 327 per ha. The density of elephant preferred fodder tree species was arrived at 112 per ha. Most of the elephants were attracted due to abundant food species in this corridor and availability of abundant water facilities and salt licks. Tourism is another developmental intervention. Organizing vehicle safari and trekking for the tourists into the private forests located in this corridor. This is one of the major problems for elephants especially during migratory season. Vehicles from Masinagudi are also washed near Kalhalla Bridge that pollutes the water used by wildlife and people in downstream of flume channel.

4. Testing of hypothesis

The hypothesis framed for the objective was "The elephants are often disturbed due to the blockage in the corridors due to the erection of buildings, schools and other concrete structures". The findings revealed that there were obstructions

in the form of schools, ashrams, patta lands filled with plantation crops, institutions and settlement villages and labor colonies which are to be removed in a phased manner through appropriate legal actions. In this circumstance, the hypothesis framed is accepted.

5. Conclusion

The Coimbatore Forest Circle is in possession of 12 elephant corridors by which elephant migration is taking place. The elephant corridors faced with obstructions in the form of schools, ashrams, patta lands filled with plantation crops, institutions and settlement villages and labour colonies which are to be removed in a phased manner through appropriate legal actions. Because of the obstacles in the corridors, the elephant migration is diverted and the animals are finding lucrative crops as its feed and damage the crops and hence regulation of cropping pattern in the vicinity of forest areas are to be avoided. Besides, the reserve forest boundary with the space of two chain lengths were presently with encroachment and those lands are to be secured from the farmers or institutions concerned. In support of this study, Singh has also identified the reduction in forest cover and the food species for the elephants during the year 2017 over the year 2005. The study has also identified the death of elephants due to train and road accidents and hence the Forest Department should establish the over bridge for animal migration in the corridors leaving the rail lines with the wall for protection of animals from crossing the railway lines.

6. References

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