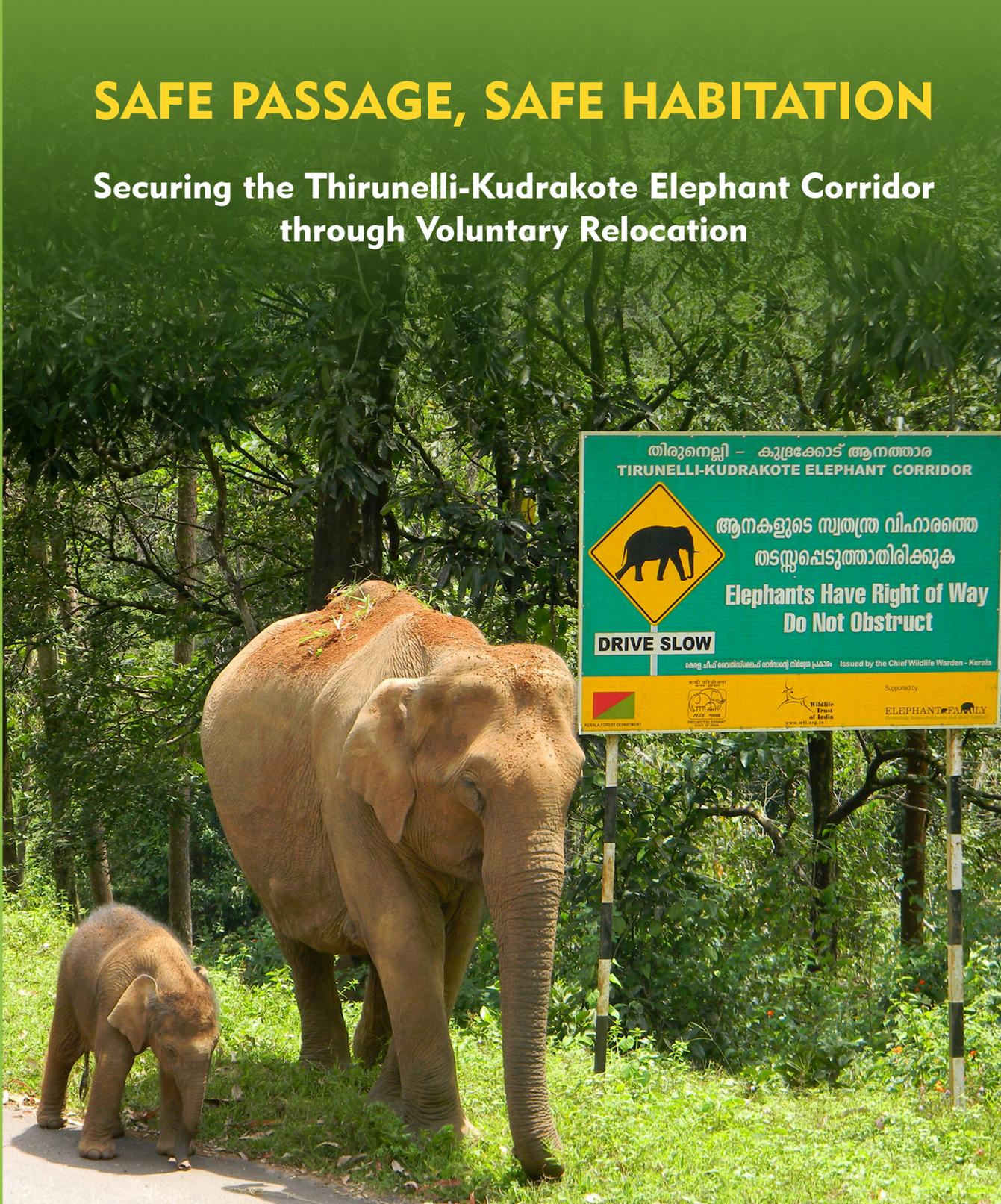


CONSERVATION ACTION SERIES 20200815

SAFE PASSAGE, SAFE HABITATION

Securing the Thirunelli-Kudrakote Elephant Corridor through Voluntary Relocation





Kerala Forests and Wildlife Department is the custodian of the natural resources of the state of Kerala. Apart from the forests, wildlife sanctuaries and national parks of Kerala, they also work to conserve the biodiversity rich and sensitive ecosystems such as mangroves, sacred groves, coastal ecosystems, wetlands, homesteads and private plantations which are outside their jurisdictional ambit.



Wildlife Trust of India (WTI) is a leading Indian nature conservation organisation committed to the service of nature. Its mission is to conserve wildlife and its habitat and to work for the welfare of individual wild animals, in partnership with communities and governments. WTI's team of 150 dedicated professionals work towards achieving its vision of a secure natural heritage of India, in six priority landscapes, knit holistically together by nine key strategies or Big Ideas.



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IUCN NL is the Dutch national committee of the International Union for Conservation of Nature, the world's largest and most diverse environmental network. IUCN NL collaborates with and supports local organisations in Africa, Asia and Latin America, together with IUCN member organisations and other parts of IUCN, to safeguard important nature and biodiversity in these regions. Together they develop international collaborative programmes and their vision is a just world that values and conserves nature and strive to safeguard nature as the basis for all life.

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SAFE PASSAGE, SAFE HABITATION

Securing the Thirunelli-Kudrakote Elephant Corridor through Voluntary Relocation

Eds: Vivek Menon, Upasana Ganguly, Sandeep Kr. Tiwari, Belinda Stewart-Cox,
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FOREWORD

Larger mammals like elephants that require extensive habitats for survival are one of the most affected ones due to the current and rapid land use changes. The spread of human settlements, commercial plantations, industry, farming, mining, linear infrastructures etc. are restricting movements of these long ranging animals. This has led to increase in human-elephant conflict in many parts of the country. Thus, the harmonious relationship between elephants and people is gradually getting strained resulting in casualties on both the ends in extreme conditions. In this context, maintenance of wildlife corridors is an essential element of managing landscape and an important tool to overcome the adverse effects of habitat fragmentation and loss for ensuring larger habitat availability, genetic exchange within and between the populations and minimizing human-elephant conflict.

The Thirunelli - Kudrakote (Brahmagiri-Thirunelli) elephant corridor in particular, is a 2200-acre strip that connects the Brahmagiri Wildlife Sanctuary of Karnataka with Wayanad Wildlife Sanctuary of Kerala through the forests of the Wayanad Forest Division further leading to Bandipur National Park. This critical corridor is a lifeline for hundreds of Asian elephants and also provides a safe passage to a number of other species including tigers.

The efforts of Wildlife Trust of India along with Kerala Forest Department and local governments has been truly a commendable step towards establishing a model which could prove to be a long-term solution to an age-old problem like Human-Elephant Conflict. The relocated villagers have displayed a remarkable gesture by vacating their agrarian lands for elephants to support their right of free passage. The corridor securement model stands as a role model showing that space can be made for the co-existence of both people and wildlife in a densely populated country like India. It is an example well set for other parts of India where humans and elephants are battling for space every day.

I congratulate the WTI team for this publication which is truly a commendable effort towards providing a roadmap for securing of elephant corridors in India through land purchase and voluntary relocation. It could be used by various agencies, including the Ministry of Environment, Forest and Climate Change (Government of India) and State Forest Departments, conservation organisations, researchers, developmental agencies, donors as well as policy makers to help protect and secure the corridors for the long-term conservation of our National Heritage Animal.


PCCF and Chief Wildlife Warden
Kerala Forest Department



PREFACE

Preserving elephant corridors and ensuring habitat contiguity for Asian elephants is an unparalleled conservation challenge of our modern times. The call of the hour is to prevent geographical isolation of elephants and ensure free passage over the long term. A unique situation such as this requires innovative solutions. Amongst all these solutions, one in which human beings move from a settled village with the primary purpose of assisting biodiversity conservation is both challenging and long-term in nature. To begin with, this option would never have been considered if the biological needs of the species were not so crucial and if the conflicts faced by people in the area were not as major. The voluntary acquiescence of the villagers had to be met with solid benefits on the ground which made it a win-win for people and animals.

It was in this light that the Thirunelli-Kudrakote corridor located at the tri-junction of the states of Karnataka, Kerala and Tamil Nadu was accorded protection through India's first private purchase model of securing land in order to facilitate wildlife movement and allow biological connectivity between two existing protected areas of Brahmagiri Wildlife Sanctuary and Wayanad Wildlife Sanctuary. The passage actually ensured that the northern Western Ghats population of elephants did not get split between the Brahmagiri hills and the rest of Karnataka including Bandipur, Nagarhole National Parks etc, thus linking at least 5000 elephants and many other species as well. The process has taken well over 10 years and still some monitoring and hand-holding continues in the region.

The unique land securement project was one of its kind in South Asia and has been heralded as an alternative strategy for a mutual coexistence between wildlife and humankind and the successful integration of the families provides the key to developing upcoming land securement projects. The learnings from the project provided Wildlife Trust of India, government bodies and other civil society organisations with a standard operating guideline that has proven to be useful in land securement projects across the country.

In the past ten years, various new land securement projects have been taken up with the Thirunelli-Kudrakote Corridor project as a model providing the baseline and has thus contributed to such projects across the country.

I am very happy that the global conservation fraternity has acknowledged the success of this project, but there is still a long way to go before all elephant corridors are secured and protected for posterity. This report attempts to document and highlight the efforts taken for this complex project and suggests a template for future projects of a similar nature.



Vivek Menon
Executive Director and CEO



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We express our sincere thanks and gratitude to all those who have contributed to the securing of the Thirunelli-Kudrakote elephant corridor and facilitating the right of passage of elephants. Our sincere thanks to the Principal Chief Conservator of Forests and Chief Wildlife Wardens of Kerala- Shri V Gopinathan, Shri V.S.Varughese, Shri Ouseph, Shri Raja Raja Varma, Shri G.Harikumar and Shri N V Trivedi Babu for according permission and assistance to the team in securing the corridor.

We are thankful to Shri. O.P. Kaler, former Additional PCCF and Dr Pramod G. Krishnan, former Conservator of Forests, Palakkad for all their support and guidance to the team. We are also thankful to the Wildlife Wardens of Wayanad Wildlife Sanctuary and Divisional Forest Officers of Wayanad South Forest Division and Wayanad North Forest Division for extending their advice, assistance and support in implementing the project. We express our sincere gratitude to the Assistant Wildlife Wardens and staff of Tholpetty Range, Wayanad Wildlife Sanctuary and the Range officers and staff of Begur Range of Wayanad North Forest Division for all their help and assistance to undertake the work.

We are thankful to the members of Panchayat, Thirunelli and local self-Government for all their support and help in facilitating the work. The work would not have been possible without the active support and assistance of the

Revenue Department, Wayanad, Manathavady for extending the necessary permission and surveys of the secured and acquired lands in the corridor.

We would also like to extend our thanks to Mr Santhosh for his legal advice while securing the corridor and Shri Anthony, the contractor who constructed the houses at relocation site and also assisted the team in identifying and helping negotiate with land owners. We also wish to thank FERNS Naturalists Society for their on-ground support in the post-relocation monitoring phase of the project.

We would like to extend our sincere gratitude and thanks to the Secretary, Forest and Wildlife, Kerala for notification of the secured corridor lands.

Our thanks also go out to our present and former colleagues from Wildlife Trust of India- Dr PS Easa, Mr Sabu Jahas, Mr AMA Nixon, Dr Sandeep Kr. Tiwari, Dr K Ramkumar, Mr Shajan MA, Mr Ramith M, Mr Tiju C. Thomas, Mr James Zacharias, Mr Santhosh, Mr V. Mohan, Mr Sathyan AV, Ms Tara Gandhi, Ms Upasana Ganguly, Ms Indu Kumari, Ms Ankita Gupta, Ms Aishwarya Joshi, Mr Jose Louies, Ms Paridhi Jain, Mr Vibhor Choudhary, Mr Kunal Sharma, Ms Poonam Chandel, Ms Mr Amlan Dutta and Ms Rupa Gandhi Chaudhury, Anjali Pathak, Dr Rahul Kaul and Mr Vivek Menon for their contribution to the success of the project and preparation of this report. We



also wish to thank Ms Belinda Stewart-Cox, Ms Caitlin Melidonis, Ms Megan Stannard and Ms Aimee Faunt from Elephant Family and Mr Dan Bucknell and Ms Monica Wrobel, former staff Elephant Family and Mr Marc Hoogeslag, IUCN NL for their detailed review and inputs to finalise the report.

We wish to thank Elephant Family, World Land Trust and IUCN Netherlands for their financial support and their role in the successful

implementation of the project, especially Elephant Family for their funding support to continue the post-relocation monitoring of the corridor and publication of this report.

Last but not the least, the people of the corridor area, who are the real champions of nature to have given up their lands for the elephants and wildlife of the area and moved to an alternate site outside the corridor.

Photo Credits

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EXECUTIVE SUMMARY

The Thirunelli-Kudrakote corridor occupies a critical space in the larger Brahmagiri-Nilgiri Eastern Ghats landscape located at the tri-junction of the states of Karnataka, Kerala and Tamil Nadu. It is recognized as one of the 28 elephant corridors of South India, that are essential for the movement of the large pachyderms between protected areas. Of the 14,612 elephants, reported from Southern India, the Brahmagiri-Nilgiri Eastern Ghats sub-population is estimated to host over 6500 elephants. This landscape requires constant protection and habitat contiguity in order to prevent the elephants from becoming geographically isolated, which could further aggravate population decline and increase in human-elephant conflict.

Recognising the importance of securing critical corridors such as the Thirunelli-Kudrakote, the Wildlife Trust of India embarked upon the project of securing this corridor in the year 2005-06. The project envisaged the securement of select areas within the corridor in order to facilitate wildlife movement and allow biological connectivity between two existing protected areas of Brahmagiri Wildlife Sanctuary and Wayanad Wildlife Sanctuary. The project also aimed to reduce human-wildlife conflict in addition to ensuring that villagers in the corridor region are able to relocate to safer location with better infrastructure in order to have a better quality of life.

Being the first project of its kind, the project

invested considerable time in developing a robust model of securement including the process of relocation of villagers. The process developed through a series of interactions and the relocation policy was in consultation with the local stakeholders. With this backdrop, the Wildlife Trust of India in collaboration with the Kerala Forest Department and local communities, and with financial support from Elephant Family, World Land Trust and IUCN-Netherlands formally initiated the project with the Private Purchase Model of corridor securement.

The key strategy was to acquire land owned by the villagers either by payment of the agreed value (in the case of non-tribal or non-Below poverty Line (BPL) family) or by providing suitable alternate land and resettlement package (for BPL families or tribals). The project made it clear from the outset that every village or resident who did not wish to relocate would not be compelled to do so and he or she could continue to live in the old site. The project also ensured that regular consultative meetings were held with the resident tribal families for getting their consent and cooperation for the relocation process. Another key aspect of the project design was in assisting the relocated families with alternate livelihoods and ensuring that government benefits reach the families.

The project also ensured that all laws related to relocation of people was consulted and adhered to including the Land Acquisition Act, 1894*. Relevant permissions were obtained from the



office of the District Commissioner/District Collector of Wayanad district along with a written consent of the villagers who had agreed to relocate.

A total of 25.3 acres of land was purchased from 37 families and they were relocated based on their prior informed consent. The purchased land was handed over to the forest department to be notified as a part of the Wayanad Wildlife Sanctuary. Periodical monitoring has shown that following the post- rehabilitation of villages there has been consistent and regular movement of elephants and other wildlife through the corridor. The rehabilitated people are also being followed to assess the impact of resettlement on their social and economic conditions, especially that of women and children. With swampy grassland that people once cultivated now available to elephants for grazing, and people settled in areas without conflict with elephants

and better access to other livelihood options, communications, healthcare, education, and electricity, the initial results from the assessment are encouraging. Thus, the relocation of the villages of Thirulakunnu, Valiya Emmadi, Kottapady and Puliyanolly was a win-win for both elephants and people. The secured corridor land eventually was declared as part of Wayanad Wildlife Sanctuary and Wayanad North Forest Division in a gazette notification in 2015.

The project came to a formal conclusion with the relocation of all the families to new locations following a mutually agreed agreement between all stakeholders. The post relocation consultations continued in the following years and is being regularly followed up with the relocated families so that the transition into the new lifestyle occurs seamlessly and all the relocated families get access to better livelihoods in the future.

**now known as The Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act, 2013*

CHAPTER 1

1.1 THE ELEPHANT AND ITS LAND

*Vivek Menon, Upasana Ganguly,
K. Ramkumar and Sandeep Kr. Tiwari*

In India, despite being a figure of traditional cultural reverence, recognised as the National Heritage Animal and given the strictest level of protection under the law, the Asian elephant is in a lot of trouble today. The crux of the problem is one that affects all wildlife in the country: land.

The elephant has always been considered an embodiment of strength, size and intelligence. It has been looked upon with mixed feelings of love, worship and fear. The human culture in elephant range countries is so closely associated with the elephant that it was the subject of a number of classical works of literature. Elephants were also part of human society and were maintained in captivity for use in war, festivals, timber logging and religious processions. Asian elephants (*Elephas maximus*) once ranged over a vast area from the Tigris and Euphrates in West Asia to South East Asia (Olivier, 1978). However, their present distribution is confined to Bangladesh, Bhutan, Myanmar, China, India, Indonesia, Cambodia, Lao PDR, Malaysia (Peninsular and Sabah), Nepal, Sri Lanka, Thailand and Vietnam (Santiapillai, 1987; Sukumar, 2011). Though the number of Asian elephants in the wild is estimated to be 48,632- 51,680 (Menon & Tiwari, 2019), they are threatened because of the loss, shrinkage and degradation of their habitat.

As India's human population has grown exponentially in the past several decades, so has its demand for resources. At its essence, this demand boils down to the requirement for more land – for agriculture, roads, dams, mines, railways, roads, housing and numerous other human needs. This has seriously impacted the country's forest cover and has led to its degradation and fragmentation.





Figure 1.1: Elephants crossing a National Highway

Being a large herbivorous animal, the elephant needs vast areas to forage through, moving from place to place with the changing seasons in search of food and water. The 'home range' of an elephant herd can vary from as little as 200 km² in Rajaji National Park (Williams *et al.*, 2008) to over 4,000 km² in the highly degraded, fragmented landscapes of Central India (Datye and Bhagwat, 1995). As elephants are forced to range farther and farther afield away from their natural habitat, and as humans encroach more and more into forest areas, there is invariably conflict with elephants. Human-elephant conflict is a very serious issue in India

today with over 450 people killed annually in encounters with elephants and millions of rupees worth of damage done to crops and property. It is estimated that elephants damage 0.8 to 1 million hectares of agricultural crops (Bist, 2002) every year. Assuming that an average farming family holds one or two hectares of land, human-elephant conflict can be said to affect at least 500,000 families. It is also true that ~100 elephants are killed each year by human greed, indifference or in retaliation for conflict. Train-hits, poaching for ivory, poisoning and electrocution are common causes of unnatural elephant deaths.



Figure 1.2: A typical human-elephant conflict scene from India

Since 1986, the Asian elephant has been listed as an endangered species by the International Union for Conservation of Nature (IUCN). India has by far the largest number of wild Asian elephants of any range state, estimated at 29,964 according to the 2017 census (MoEF&CC, 2017a), which constitutes about 58% of the species' global population. They range in 30 Elephant Reserves spread over 10 elephant landscapes in 14 states, covering about 65,814 km² of forests in north-east, central, north-west and south India. While this appears to be a vast territory, it needs to be taken into consideration that elephant reserves include areas of human use and habitation. In fact, unless they lie within existing Reserve Forests or in the Protected Area network, elephant reserves are not legally protected habitats by themselves. A large chunk of the country's elephant habitat is therefore unprotected, susceptible to encroachment, or is already in use by humans. While major elephant populations

are found in protected forests in the north-eastern states (10,139 individuals), east-central India (3,128 individuals), the Himalayan foothills in the north (2,085 individuals), and the Western and Eastern Ghats (14,612 individuals) in the south, the animals require free movement between these areas to maintain their genetic flow and to offset seasonal variations in the availability of forage and water.

The key aspect of landscape scale planning for wildlife conservation is to ensure that the target species is able to move without major hindrance so that its seasonal home ranges are accessible and gene flow is maintained across the defined landscape. This requires maintaining, augmenting, and protecting 'corridors' for animal movement across the landscape (Sukumar *et. al.* 2016). As forest lands continue to get fragmented, relatively narrow and linear stretches of vegetation form vital natural habitat linkages between larger forest patches. These are called '*Elephant Corridors*' and are critical



for conservation since they allow elephants to move between secure and viable habitats freely with least human disturbance. Corridors are linear landscapes that connect two or more patches of viable elephant habitats that were connected in historic times (Soule and Gilpin, 1991). Corridors connect populations, facilitate gene flow, optimise habitat utilisation through

reduction of pressure on grazing or browsing areas, and provide resources to animals passing through. Corridors increase the biological and ecological viability of species and populations. In the Indian context, elephant corridors are also critical for other wildlife including India's endangered National Animal, the tiger (*Panthera tigris*).

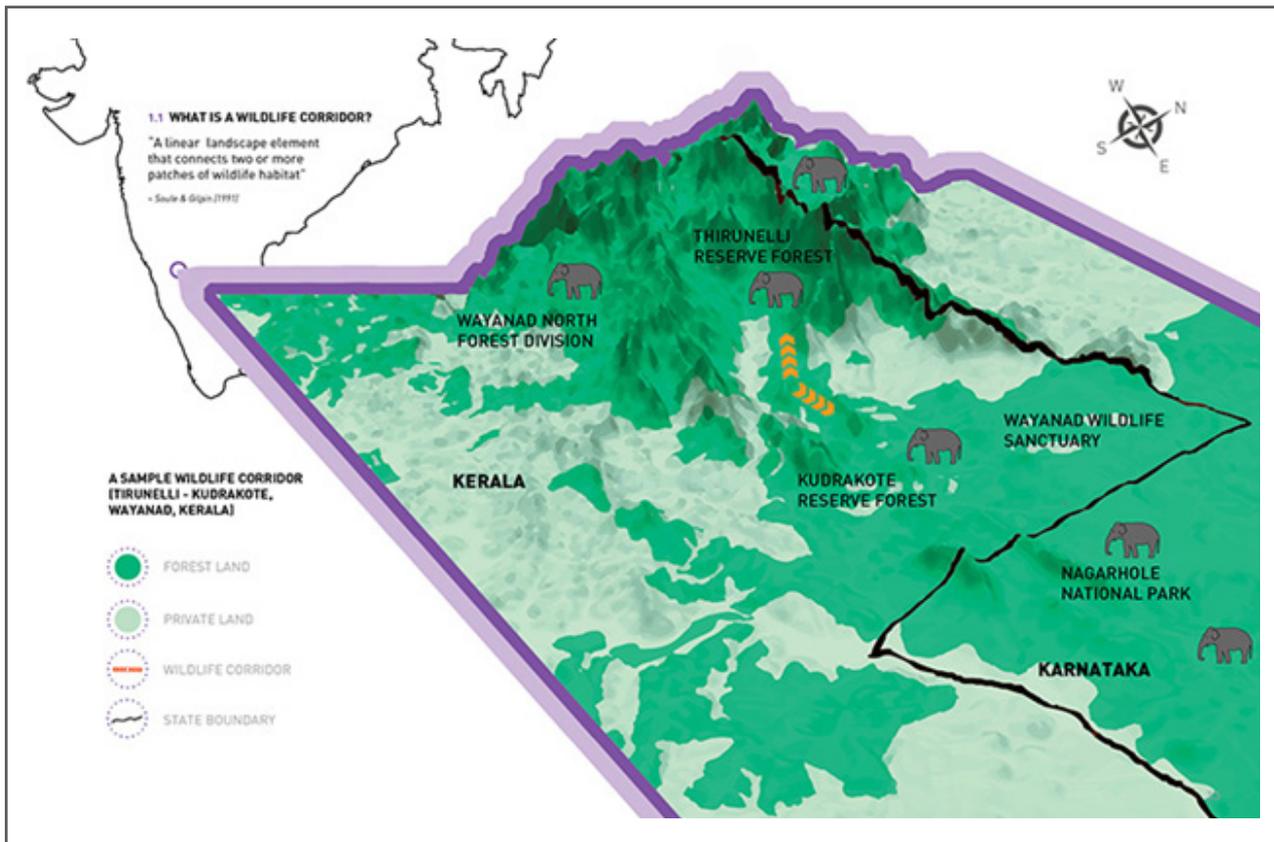


Figure 1.3: Representative wildlife corridor

1.2 Right of Passage

Realising the need to connect forest areas with corridors of green cover, Wildlife Trust of India (WTI), International Fund for Animal Welfare (IFAW), the US Fish and Wildlife Services (USFWS) and the Asian Nature Conservation Foundation (ANCF), in collaboration with State Forest Departments, Project Elephant and a team of researchers, identified 88 elephant corridors and published a report “Right of Passage: Elephant Corridors of India” in 2005 (first edition) (Menon *et al.*, 2005). However, due to the lack of legal protection for corridors and land use changes over the next 10 years, the elephant habitats and corridors continued to be negatively impacted. Therefore, to update the information on the status of the existing corridors, to identify new corridors which had emerged in the intervening decade, and to prepare conservation plans for securing these corridors, WTI undertook a new survey in 2015 in collaboration with Project Elephant, along with field support from the State Forest Departments. The second edition of “Right of Passage: Elephant Corridors of India” (Menon *et al.*, 2017) was published in 2017, which is 12 years after the first edition. This report, prepared in partnership with Elephant Family, listed a minimum of 101 corridors that connected elephant habitat and were being used regularly by elephants. Of the corridors identified in 2005, at least seven were listed as being impaired (as of July 2019) due to land use changes and lack of legal protection. A few more were listed as being on the verge of impairment and requiring corrective measures to be taken swiftly. The report suggested acquiring or securing of these corridor lands as one measure for long-term conservation and ensuring safe passage for wildlife.

Conserving large mammals requires a landscape approach, as emphasised by the National Wildlife Action Plan (2017-31) that has been drawn up by the Government

of India (MoEF&CC, 2017b). Given the complex mosaic of protected areas, forests under government control (both the forest department and revenue department), private forests, and other private lands that may serve as passages for animals within a landscape, the possibility of reward-based methods both for community-owned and privately-held lands should be explored. It is important for a densely populated country like India to give careful thought to the manner in which land is secured for creating wildlife corridors. There are limits to the extent to which land can be purchased or acquired by the government or other conservation agencies for strengthening corridors. Ideally, the complete takeover of land should be restricted to small, critical parcels of privately-owned land through a transparent and voluntary process.

In an ideal scenario, connectivity would involve high levels of conservation attention to specific, well-defined corridors complemented by regulations to prevent detrimental land use in the surrounding landscape and, using financial incentives, promote wildlife-friendly land use; a modified version of the ‘conservation easements’ which are in vogue in North America (Rissman *et al.*, 2013) may be best suited to developing countries (Gichohi, 2003).

With this aim, over the years WTI has developed four approaches for securing and protecting elephant corridors in the country. These models have been adopted in the corridor conservation plans. The four models are as follows:

- 1. The Public Initiative Model:** Creating empowered local stakeholders through the Green Corridor Champions initiative to ensure that each and every corridor is monitored in perpetuity; engaging with communities and stakeholders through public campaigns and spot interventions.
- 2. The Government Securement Model:** Focusing on policy advocacy and providing



central and state government agencies with technical assistance and ‘soft hands’ for securing key corridors through official schemes of purchase and rehabilitation.

3. **The Private Purchase Model:** Directly purchasing land, voluntarily rehabilitating communities, and transferring the purchased land to the state forest department for legal protection (a successfully implemented model is in place).
4. **The Community Securement Model:** Community owned lands are set aside through easements or bilateral benefit-sharing models; working with community based organisations (CBOs).

(Sukumar, 1989). About 14,612 elephants (MoEF&CC, 2017a) are reported in this region. Most of the elephant ranges in this region are hilly with tropical wet evergreen, semi-evergreen, moist deciduous, dry deciduous and dry thorn forests in addition to high altitude shola grasslands and plantations. There are about eight sub-populations of elephants within this range based on contiguity of habitats. Of these, the Brahmagiri-Nilgiri-Eastern Ghats sub-population is the single largest sub-population of elephants in Asia, extending from the Brahmagiri Hills to the Eastern Ghats, comprising Wayanad in Kerala, the Nilgiri Hills, Sathyamangalam Tiger Reserve,

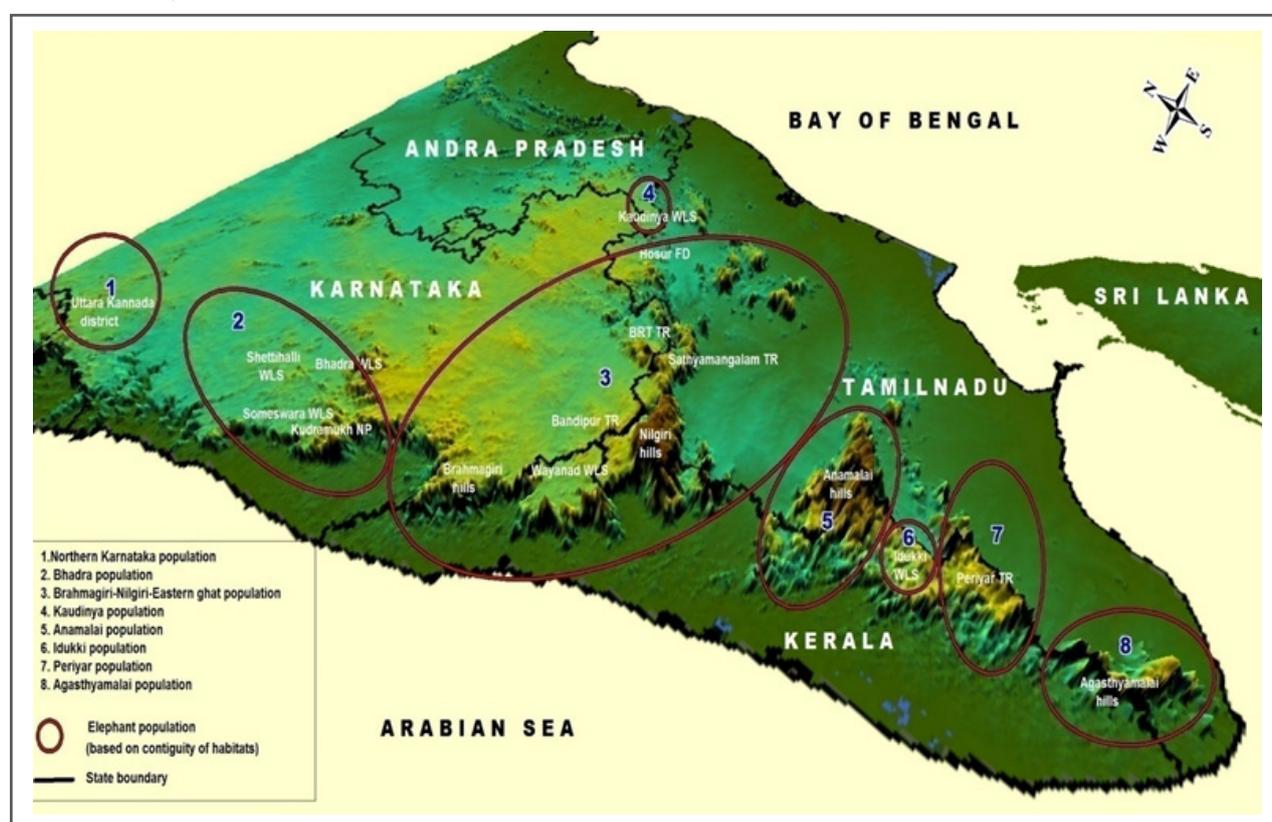


Figure 1.4: Elephant sub-populations of the Southern Indian Population

1.3 Elephant Corridors of South India

Of the elephant populations across the four regions of the country, the Southern Indian elephant population is distributed over a large area spreading across the Western Ghats and parts of the Eastern Ghats in Kerala, Tamil Nadu, Karnataka and Andhra Pradesh

Dharmapuri Forest Division, Hosur Forest Division, Cauvery North Wildlife Sanctuary of Tamil Nadu and the two protected area complexes of Karnataka namely Bandipur-Nagarahole, the Biligiri Rangaswamy Temple - Male Mahadeshwara Hills and Cauvery, and Bannerghatta National Park in Karnataka. The national census estimates that the forested tracts



of sub-populations host over 6,500 elephants (MoEF&CC, 2017a). In addition, since the area is contiguous with the Eastern Ghats, the actual population could exceed 8,000-8,500 elephants.

The Brahmagiri-Nilgiri-Eastern Ghats landscape has nearly a quarter of its area (i.e. over 3,300 km² out of total of about 12,600 km²) declared as part of the Protected Area network. However, the landscape is also dominated by a large human population which has resulted in degradation and fragmentation of the habitat and increased incidences of human-wildlife conflict that need to be urgently addressed. Of the 28 elephant corridors identified in South India, 20 are found in this landscape. These are: 1) Karadikkal – Madeswara, 2) Tali – Bilikkal, 3) Bilikkal – Javalagiri, 4) Edayarhalli – Guttiyalattur, 5) Edayarhalli – Doddasampige,

6) Chamrajanagar – Talamalai at Punjur, 7) Chamrajanagar – Talamalai at Muddahalli, 8) Talamalai – Guttiyalattur, 9) Avarahalla – Sigur, 10) Kalhatti – Sigur at Glencorin, 11) Kaniyanpura – Moyar, 12) Moyar – Avarahalla, 13) Kalmalai – Singara and Avarahalla, 14) Periya at Pakranthalam, 15) Thirunelli – Kudrakote, 16) Begur – Brahmagiri, 17) Kottiyur – Periya, 18) Jaccanaire Slope – Hulikal Durgam, 19) Anaikatti North – Anaikatti South, 20) Mudumalai – Nilambur via O’ Valley. These corridors need to be secured and protected to provide habitat contiguity to elephants in order to prevent these populations from becoming permanently isolated, which could aggravate their population decline due to genetic isolation and may also serve to increase human-elephant conflict.

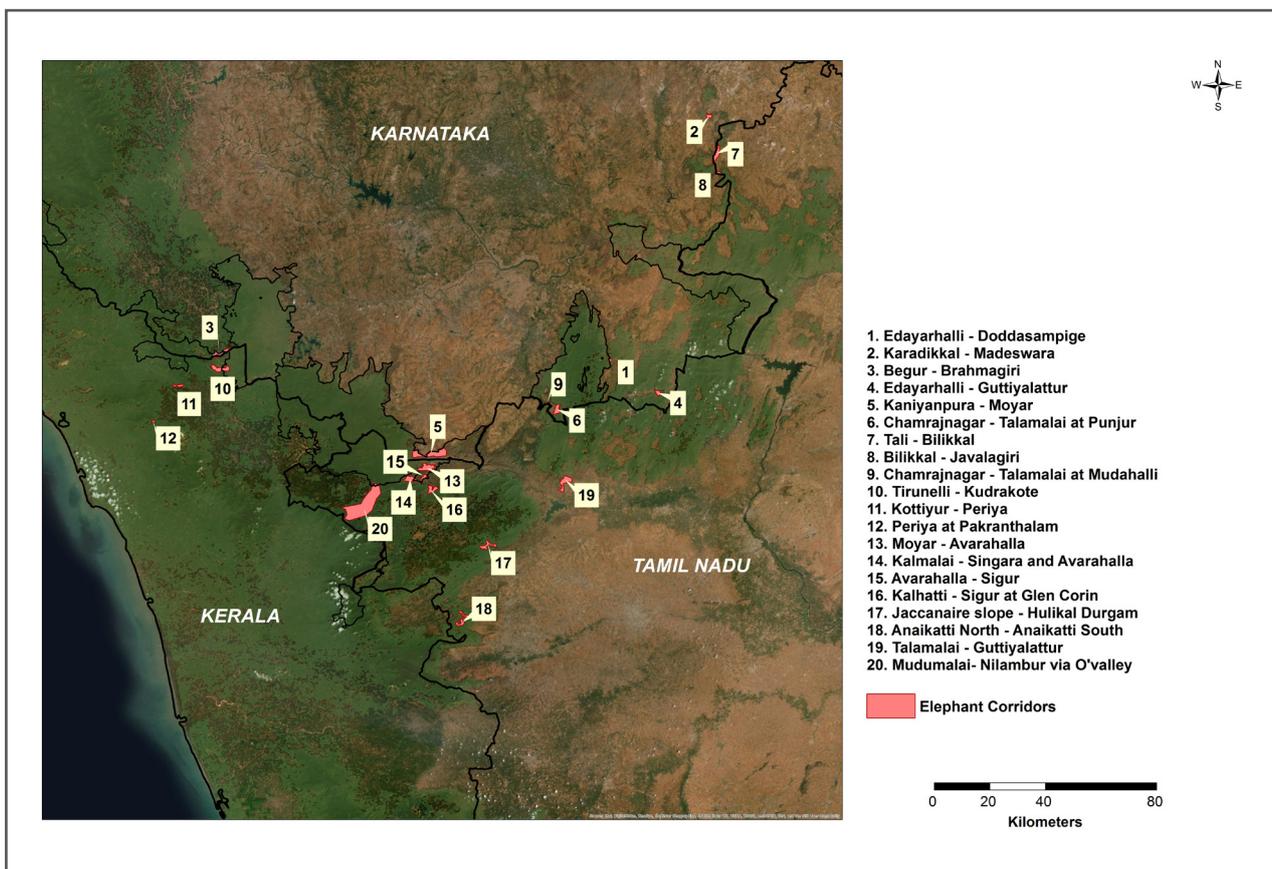


Figure 1.5: Corridors in Brahmagiri-Nilgiri-Eastern Ghats landscape



The Thirunelli - Kudrakote (Brahmagiri-Thirunelli) elephant corridor in Wayanad in the South Western Ghats is one of the critical corridors identified by WTI (Menon *et al.*, 2005 and 2017). Deep in the deciduous montane forests of the Western Ghats, this 2,200 acre strip of land connects the Brahmagiri Wildlife Sanctuary of Karnataka with the Wayanad Wildlife Sanctuary of Kerala through the forests of the Wayanad North Forest Division which leads to the Bandipur National Park and Nagarhole National Park. A lifeline for more than 6,500 Asian elephants, this corridor is vital for the survival of the species. It also provides safe passage for a number of other

species including tigers. A part of the land that now comprises the corridor is still protected forest, but part of it was agricultural land and settlements which suffered from crop depredation by elephants. Of the seven villages within the corridor, five (Thirulakunnu, Valiya Emmadi, Kottapady, Puliyanakolly, and Sulthar Vayal) were located at strategic points in the corridor, greatly reducing its width. It was therefore necessary to secure and protect that land with urgency. This report documents the processes, challenges and successes in securing this corridor thus, providing a case study for similar conservation methods adopted elsewhere to reconnect landscapes.

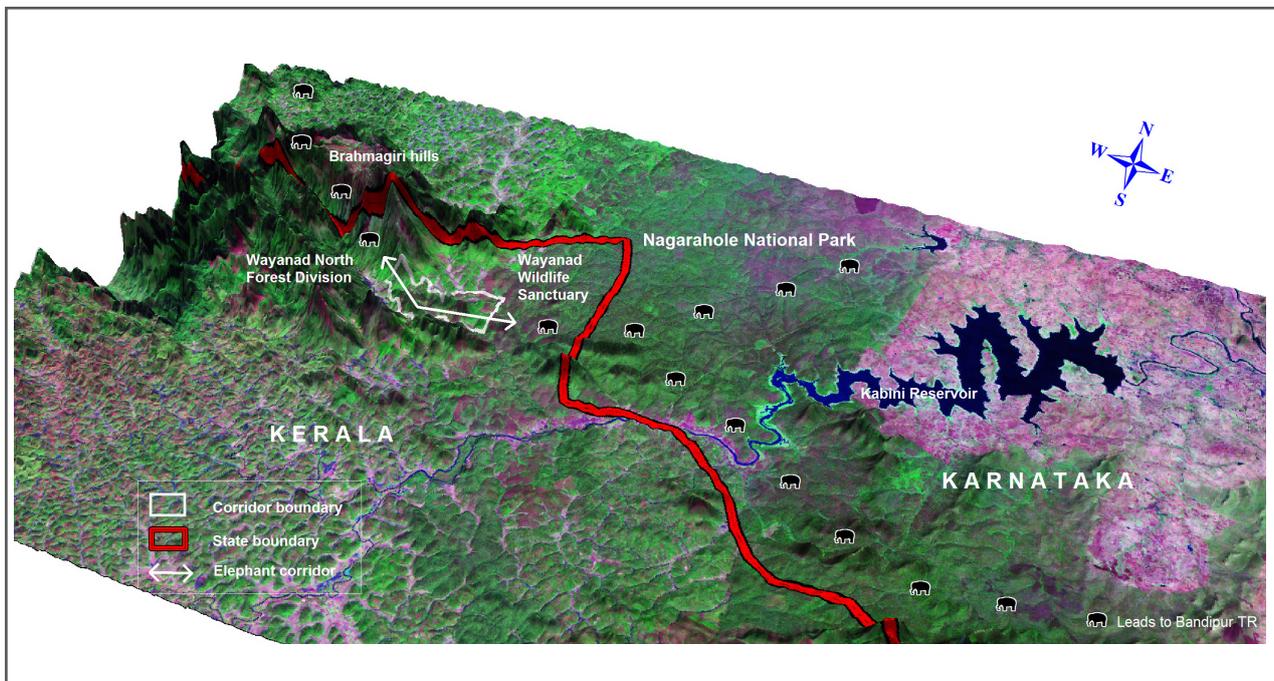


Figure 1.6: 3D map of Thirunelli-Kudrakote Corridor

CHAPTER 2

WAYANAD: SWAMPLANDS AND ELEPHANTS

*Vivek Menon, Upasana Ganguly, Ankita Gupta
and Sabu Jahas*

The Wayanad district in Kerala, largely dominated by hills and plateaus is an important elephant habitat within the Nilgiri Biosphere Reserve and is contiguous with Bandipur Tiger Reserve, Mudumalai Wildlife Sanctuary and Nagarahole Tiger Reserve. Part of the district has been declared as the Wayanad Elephant Reserve which is spread over 1,200 km² and has an elephant density of 0.25 elephants/ km² (MoEF&CC, 2017a). The elephant habitat in the landscape is fragmented by human settlements, agriculture, large scale plantations of coffee and spices, and linear infrastructures.

2.1 Profile of Wayanad district

Wayanad district lies between latitudes 11°26'28" and 11°48'22" and longitudes 75°46'38" and 76°26'11". The name Wayanad has been derived from the Malayalam words '*Vayal Nadu*' - or the 'Land of Swamps'. Today the word *Vayal* is also used for paddy fields as it denotes low lying, flooded areas which were once swamps. The district is situated geologically on the southern tip of the Deccan plateau and is known for its majestic forests, hills and deep valleys. Wayanad was administratively formed on 1st November 1980 as the 12th district in Kerala by carving out areas from Kozhikode and Kannur districts. The total area of Wayanad district is 2,131 km² and the headquarters are at the town of Kalpetta.



2.2 History of Wayanad District

Wayanad has a human history dating back to at least 1,000 BC. The earliest record of a ruling family in Kerala exists in Wayanad which is documented by a rock inscription in the Edakkal Caves. One of the inscriptions was transcribed by Dr. Hultzch, the first chief epigraphist of the Archaeological Survey of India, to be '*the writing of the glorious Vishnu Varma, the propagator of the 'Kudumbiyil family'*' (Nair, 2000). Wayanad is unique in its political history as it was the only *taluk*¹ in Malabar which resisted both the Mysore yoke of Tipu Sultan, and defied the British Empire until its ruler fell, fighting against the troops of the East India Company. This ruler was Kerala Varma Raja of Pazhassi Kovilakam of the Kottayam dynasty who is popularly known as Pazhassi Raja. His history is practically the political history of Wayanad from 1786 to 30th November 1805.

When Hyder Ali became the ruler of Mysore, he invaded Wayanad and brought it under his rule. In the days of his successor Tipu Sultan, Wayanad was restored to the Kottayam royal dynasty through the Sreerangapattanam truce that Tipu made with the British after facing fierce resistance from Pazhassi Raja. It was only after Pazhassi Raja's capture and death through treachery that the British found a foothold in Wayanad. The British domination changed Wayanad's historical trajectory particularly after it opened up the plateau for cultivation

of tea and other cash crops. Roads were laid across slopes of Wayanad, from Kozhikode and Thalassery. Extending to the cities of Mysore and Ooty through Gudalur. Using the roads, settlers poured in from all parts of Kerala and the virgin forestlands proved a veritable goldmine with incredible yields of cash crops.

2.3 Topography

The district of Wayanad is bounded on the East by the Nilgiris and Mysore districts of Tamil Nadu and Karnataka respectively, on the west by Kozhikode and Kannur districts, on the north by Coorg district of Karnataka, and on the south by Malappuram district. Hills are lower in the centre of the district, while the northern area has high hills. Some of the major peaks in Wayanad district (Banasura, Vellarimala, Brahmagiri, Chembra, etc.) range from 1,500m to 2,100m in height. Topographically, Wayanad has two major highlands in the northeast and southwest. The north-eastern portion of the district rises up to a hill range called Brahmagiri. The north-eastern sides are flat and open. The south-western corner of Wayanad is a knot of isolated ridges called the Chembra-Vellarimala mountain range. About 885.92 km² of the area is forested, and the valleys in the region are predominantly paddy fields whereas the lower hills are full of tea, coffee, pepper and cardamom plantations.

¹**Taluk:** an administrative district for taxation purposes, typically comprising a number of villages.



Figure 2.1: View of the Wayanad landscape

2.4 Rivers

Due to the peculiar terrain and mountainscape, there are east and west flowing rivers in the district. The Panamaram, Mananthavady and Thirunelli rivers flow east, merging to form the Kabini river. The Kabini is a tributary of the Kaveri river, which joins in Karnataka before flowing through Tamil Nadu into the Bay of Bengal. A major part of the district of Wayanad is drained by the Kabini River and its three tributaries. The beds of these rivers do not permit any navigation except the floating of timber as the riverbeds are extremely rocky and shallow.

2.5 Climate

Kerala has a tropical monsoon climate with seasonally excessive rainfall and hot summers. The district of Wayanad in Kerala is a highland region with a unique local climate as it is cut

off from much of its surroundings by mountain ranges.

The elevated mountainous plateau lying on the crest of the Western Ghats has an average altitude of 1,000 m above sea level. On the basis of climatic conditions, the year may be divided into four seasons; winter (December-February), summer (March-May), south-west monsoon (June-September) and north-east monsoon (October-November). Physically, Wayanad sits where the Western Ghats and Eastern Ghats converge, bringing together the elements of both systems in one place (Kumar and Srinath, 2011).

The district experiences a mean rainfall of 2,322mm with a distinct rainfall gradient across Wayanad plateau that goes from a high in Lakkidi, Vythiri and Meppadi in the south-west to a low in Pulpally and other places in the north-west. The primary rainfall season of the region is during the south-west monsoon.



The average minimum temperature of Wayanad is 13.87°C and the average maximum temperature is 33.97°C. January and February are the coldest months and March and April are the hottest. One of the wettest locations in the entire country, it generally has a cool climate throughout the year. A mean average of 2,322mm rainfall has been recorded, although areas like Vythiri are known to average anything between 3,000mm and 4,000mm of rainfall annually.

2.6 Geomorphology and Soil Type

The various soil types in Wayanad district include laterite, forest loam, riverine alluvium and brown hydromorphic soil. In some areas of the district, laterite soil is reddish brown in colour. It is formed under a tropical monsoon climate with alternate dry and wet seasons. Forest loams formed by weathering under forest cover are found in Mananthavady, Kalpetta and Sultan Bathery blocks, which are rich in organic matter, nitrogen and humus. Brown hydromorphic soil is slightly acidic in nature and formed by transportation and sedimentation of material from hill slopes. Riverine alluvium found along the banks of Kabini, Chaliyar and its tributaries contains moderate organic matter, potash, phosphorous and nitrogen.

2.7 Characterisation of Forests

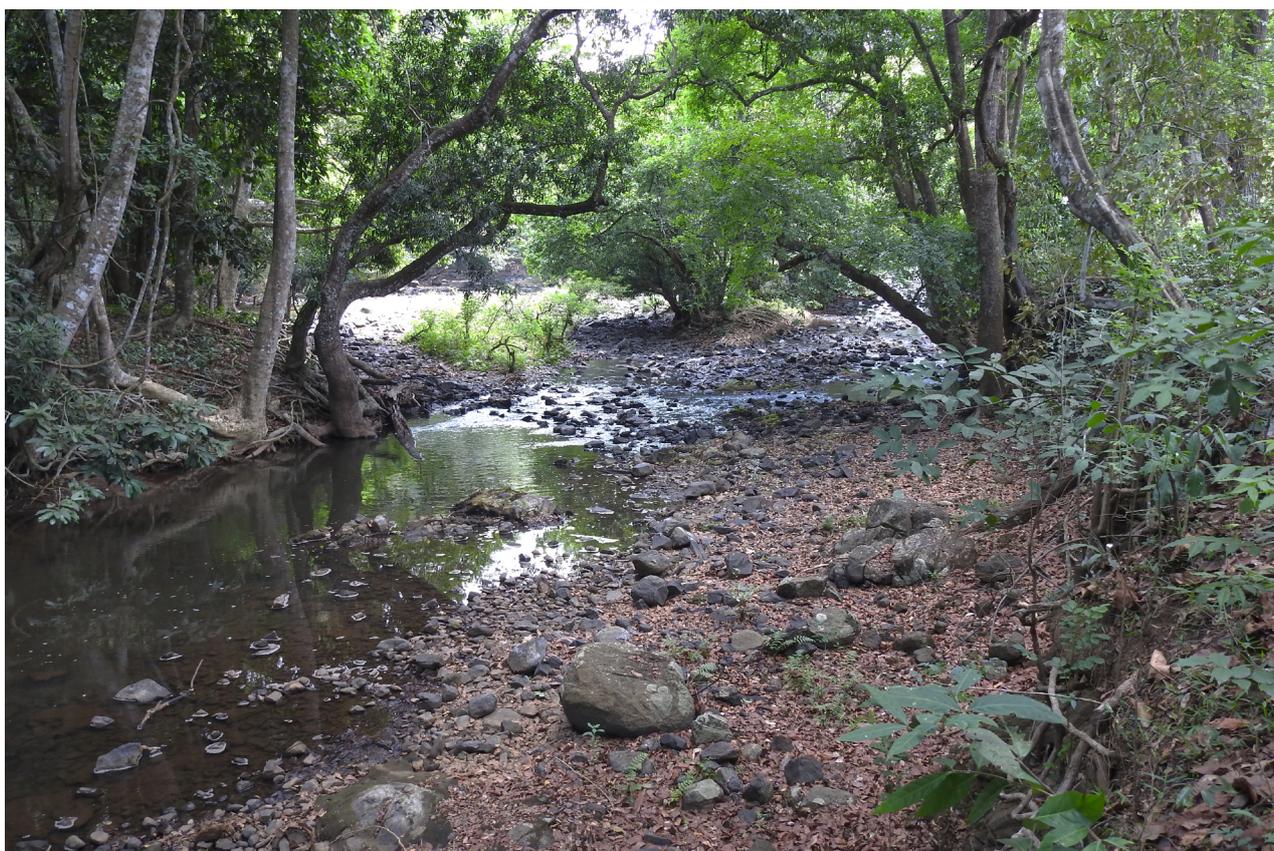
The forests of the Wayanad Wildlife Division form the major catchment for the tributaries of Kabini river system. Based on the revised classification of Indian forest types by

Chandrasekharan (1962) and Champion and Seth (1968), the natural vegetation of the Wayanad Wildlife Sanctuary is classified into South Indian moist mixed deciduous forests and Southern dry mixed deciduous forests. Moist deciduous forests are spread over all the forest ranges of Wayanad Wildlife Sanctuary and are the most common naturally occurring forests in the region. The chief characteristic of moist deciduous forest is the leafless period in the dry season. The moist deciduous forests are found in the west and south of Rampur Reserve (Sultan Bathery Range), south and west of Mavinahalla Reserve Forest (Muthanga Range), most of Kurichiat Reserve Forest (Kurichiat Range) and Begur Reserve Forest (Tholpetty Range). The Southern dry mixed deciduous forests are mostly confined to along the interstate forest boundaries in the Rampur Reserve Forest and Mavinahalla Reserve Forest.

2.8 The Wayanad Forest Complex

Wayanad, consisting of the forests under the administration of North Wayanad, South Wayanad and Wayanad Wildlife Sanctuary Divisions, forms a major portion of Nilgiri Biosphere Reserve. The Wayanad Wildlife Division consists of Muthanga Range, Sultan Bathery Range and Kurichiat Range towards the South and the Tholpetty Range towards the North. The district is also contiguous with several large Protected Areas (PAs). Towards the south-east, Wayanad is contiguous with Mudumalai Tiger Reserve of Tamil Nadu and towards the east and north, it is contiguous with Bandipur Tiger Reserve and Nagarhole Tiger Reserve of Karnataka.





Figures 2.2-2.3: Forests of Wayanad Wildlife Sanctuary



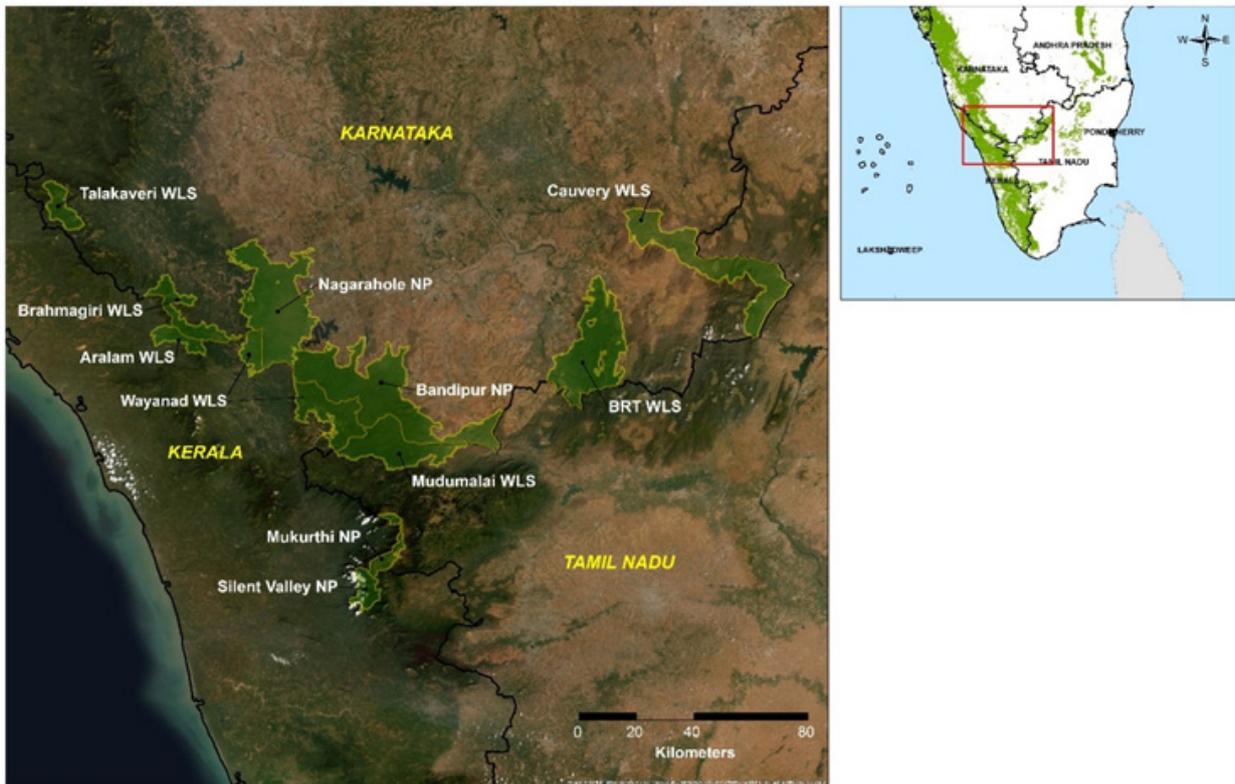


Figure 2.4: Map of Nilgiris Biosphere Reserve, showing Wayanad Wildlife Sanctuary lying alongside many contiguous protected areas

The Wayanad Wildlife Division as an administrative unit has 344.44 km² of Wildlife Sanctuary area (Sunil Kumar, 2012), spread over two discontinuous units that are 77.67 km² and 266.77 km² respectively. The larger patch falls in the Sultan Bathery *Taluk* of Wayanad Revenue District and the other patch falls in the Mananthavady *Taluk* of Wayanad district.

The Wayanad Wildlife Sanctuary was originally carved out of a biologically rich and contiguous area of the erstwhile Kozhikode territorial division and Wayanad territorial divisions in 1973. The sanctuary has a demarcated Core Zone (111 km²) located largely along the inter-

state forest boundaries and the remaining is the buffer zone (233 km²) with a small tourism zone. The headquarters of the Wayanad Wildlife Sanctuary are located in Sultan Bathery Town.

Within the larger conservation landscape of the Western Ghats, the Wayanad Wildlife Sanctuary is of great importance. It provides a crucial corridor for the seasonal migration of several species, in particular, long-ranging elephants.

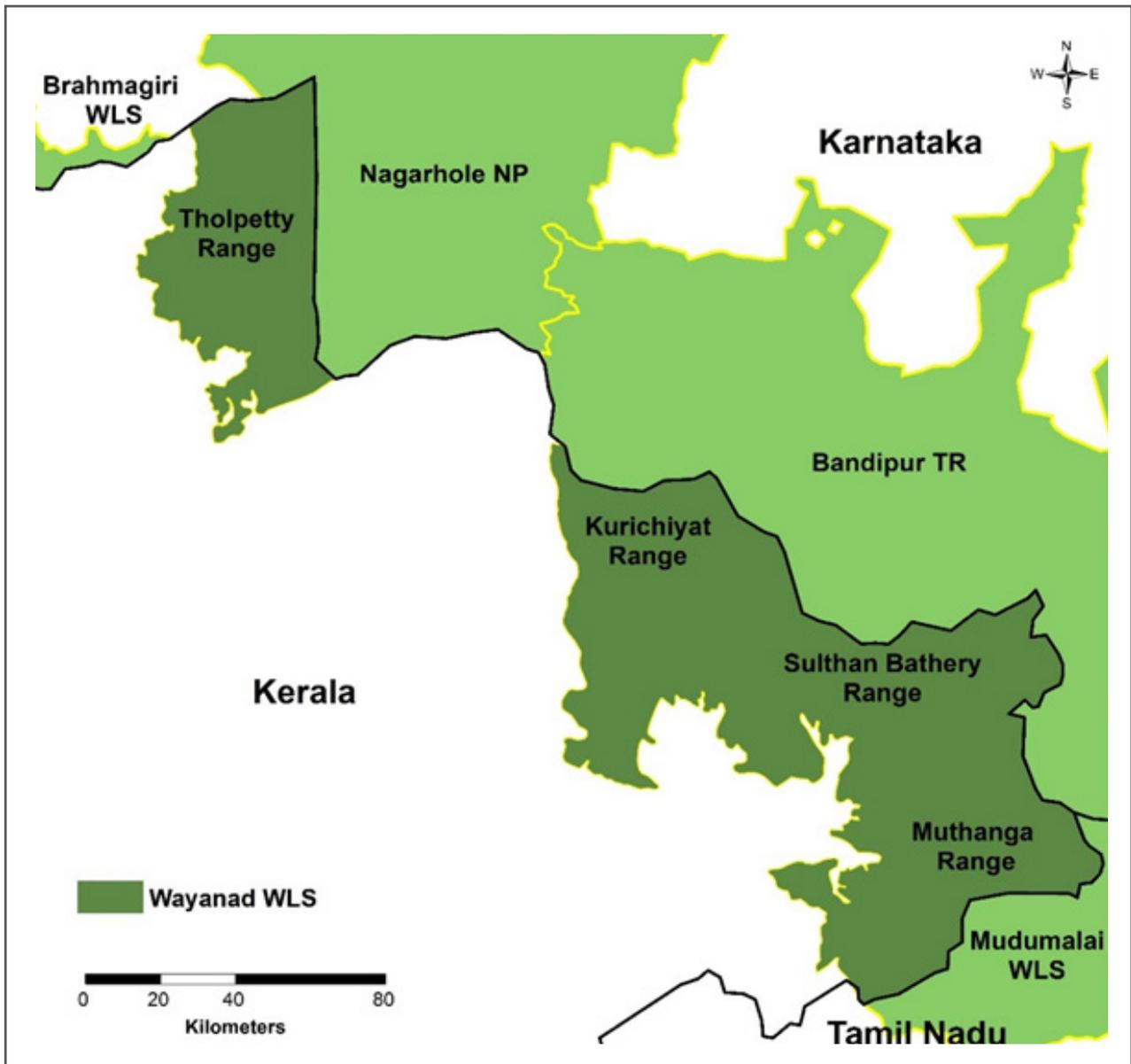


Figure 2.5: Map showing Wayanad Wildlife Sanctuary

2.9 Flora

Micro-climatic fluctuations coupled with edaphic, topographic and biotic factors have endowed Wayanad Wildlife Sanctuary with considerable floral diversity. Higher frequencies of Axle-wood tree (*Anogeissus latifolia*) and Silvery grey wood (*Terminalia tomentosa*) are found in these forests. Vast patches of *Olea dioica*, a semi-evergreen species are present in certain localities. Wild guava (*Careya arborea*), Rosewood (*Dalbergia latifolia*), Chebulic myrobalan (*Terminalia chebula*), Kydia (*Kydia calycina*), Yellow snake tree (*Stereospermum*

colais) etc. are some of the other dominant tree species. Shrubs such as Indian screw tree (*Helicteres isora*) and Indigo berry (*Randia uliginosa*), and herbs like goat-weed (*Ageratum conyzoides*), Indian snakeroot (*Rauvolfia serpentina*), and Flannel weed (*Sida cordifolia*) etc. are also present. The forests of Wayanad are famous for woody climbers like Elephant creeper (*Entada rheedii*), Ukshi (*Calycopteris floribunda*) etc. Giant thorny bamboo (*Bambusa bambos*), Male bamboo (*Dendrocalamus strictus*) and Kerala reed bamboo (*Ochlandra scriptoria*) are common bamboo species of the region.





Figure 2.6: Flora of Wayanad Forests

2.10 Fauna

Forty-five species of mammals are reported in the Wayanad Wildlife Sanctuary. Tiger (*Panthera tigris*), Sambhar (*Rucervus unicolor*), Sloth bear (*Melursus ursinus*), Common leopard (*Panthera pardus fusca*), Asian elephant (*Elephas maximus*) and Gaur (*Bos gaurus*) are some of the large mammals common in the park. Three to four species of grey langur coexist in Wayanad, which is likely their area of speciation. The Bonnet macaque and the Malabar giant squirrel are very common throughout the park. The Asian elephant is one of the flagship species of this sanctuary. Wayanad's damp, highly elevated forests are important refuges for elephant herds migrating from drier parts of the Nilgiri Reserve in search of food and water.

During the dry summer months, from March to May, elephant population densities in Wayanad are among the highest in Asia (Locke,

2016). The Nagarahole-Bandipur-Mudumalai-Wayanad complex is also one of the most important tiger habitats in the country.

The last bird survey conducted in 2009 reported 227 species, which amounts to approximately 48% of the total bird species reported from the state of Kerala. The Wayanad Wildlife Sanctuary is also the only remaining habitat of critically endangered vultures (White-backed and Red-headed) in Kerala. There are 28 diurnal raptors and 31 bird species that are listed under Schedule I of the Wildlife Protection Act (1972). Six species of birds are reported to be endemic and six others are globally threatened. The Wayanad and Banasura Laughing Thrushes are new bird species found only in Wayanad, which have been split from their relatives recently.

Preliminary surveys indicate the presence of 50 species of reptiles including eight Western Ghats endemics. The sanctuary has 35 species of amphibians out of which eight species are





Figures 2.7-2.10: Mammals of Wayanad Wildlife Sanctuary

endemic to the Western Ghats. The Malabar tree toad (*Pedostibes tuberculosa*), Malabar ramanella (*Uperodon triangularis*), Glandular bush frog (*Raorchestes glandulosus*), Malabar gliding frog (*Rhacophorus malabaricus*) and Bi-coloured frog (*Clinotarsus curtipes*) are some of the amphibian species found in the Wayanad Wildlife Sanctuary.

A total of 80 species of fish have been reported from Wayanad Wildlife Sanctuary out of which 43 species are endemic to the Western Ghats, four are endemic to Kerala and two endemic to Wayanad. A total of 143 species of butterflies including eight Western Ghats endemics are known from this area. 51 species of dragonflies, which include 11 species of Western Ghat endemics are reported from the region.





Figure 2.11-2.12: Elephants in Wayanad Wildlife Sanctuary

2.11 Human Demographic Statistics

As per the Census of India (2011), Wayanad district has a population of 817,420 people, comprising 401,684 (49.14%) males and 415,736 females (50.86%). The population of children between the age of 0-6 is 92,324, which is 11.29% of the total population. There are 32,578 (3.99%) Scheduled Caste (SC) and 151,443 (18.53%) Scheduled Tribe (ST) individuals within the population. Out of the total population, 96.14% live in urban areas and 3.86% live in rural areas. As per the Census of India 2011, Wayanad has a sex ratio of 1,035 females for every 1,000 males. The decadal growth rate of Wayanad district is 4.71% against the state growth rate of 4.91%. The density of the population is 384 persons per km² in Wayanad district against 860 persons per km² in Kerala which is a key demographic factor for conservation purposes as it shows that there are still large areas which have low population as compared to most others parts of the state.

2.12 Literacy

Out of the total 645,585 literates in Wayanad district, 328,136 (92.51%) are male and 317,449 (85.70%) are female. The literacy rate of Wayanad district is 89.03% against the state literacy rate of 94% owing to many people still living within forests or in remote areas.

2.13 Tribes

Wayanad has a large scheduled tribe population consisting of the prominent tribal communities of the Paniyas, Kattunayakans, and Kuruchians. Paniyas are a predominantly landless group, with a history of serving as labourers in agricultural plantations. Paniyas inhabit the regions of Wayanad and the neighbouring parts of Kannur and Malappuram. Kattunayakans are traditionally forest-dwelling hunters and gatherers, used to living in remote, isolated communities from well-populated areas.

Members of the Kattunayakan Tribe can be classified into four categories based on their source of livelihood:

1. Food gatherers and landless laborers who work on the land and nearby forest regions.
2. Temporary cultivators who own less fertile land which is insufficient for their living.
3. Cultivators who own fertile land.
4. Employed as *mahouts* (captive elephant caretaker) in forest departments and *Devaswoms*².

The Kattunayakans are found in Wayanad, Kozhikode and Malappuram districts. Kuruchians are a more settled agricultural community who have done better for themselves within Wayanad. Other tribes such as the Adiyas, who are among the poorest of the Kerala tribal groups, are also present in Wayanad.

²*Devaswom* (Sanskrit: Property of God) are socio-religious trusts in India that comprise members nominated by both government and community. Their aim is to manage Hindu temples and their assets and to ensure their smooth operation in accordance with traditional rituals and customs





Figure 2.13-2.14: Members of the Kattunayakan community group from the corridor area

CHAPTER 3

THE MECHANICS OF SECURING AN ELEPHANT CORRIDOR

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3.1 Background

The Right of Passage publication has systematically assessed the status of all the identified elephant corridors in the country, and prioritised them for conservation interventions and protection (Menon *et al.*, 2005 and 2017). The report has been endorsed by Project Elephant, the Ministry of Environment, Forests and Climate Change, and all state forest departments. The Elephant Task Force formed in 2010 also recognised these corridors and strongly recommended that they be legally protected and secured through various approaches (Rangarajan *et al.*, 2010). Since then, the ‘Right of Passage’ book has been recognised as the bedrock of elephant conservation efforts, and a critical reference tool in infrastructure and development planning as well.

“We were forced to remain indoors and quietly pray that the elephants go away soon,”

said Kenchan, recalling the fear psychosis created by these conflicts.

WTI set out to implement its first-ever corridor securement project in Wayanad in 2005-06 with a key component of voluntary relocation of people for the conservation of elephants. The objective of this project was to secure the area within the identified Thirunelli-Kudrakote corridor to allow biological connectivity between two existing Protected Areas in the Nilgiri Biosphere Reserve (i.e. Brahmagiri Wildlife Sanctuary and Wayanad Wildlife Sanctuary through the North Wayanad Forest Division) and to facilitate wildlife movement, specifically of elephants (Fig 3.1). The project also aimed to reduce the high human-wildlife conflict which was inevitable given that this is a frequently used area by wildlife and human beings alike.



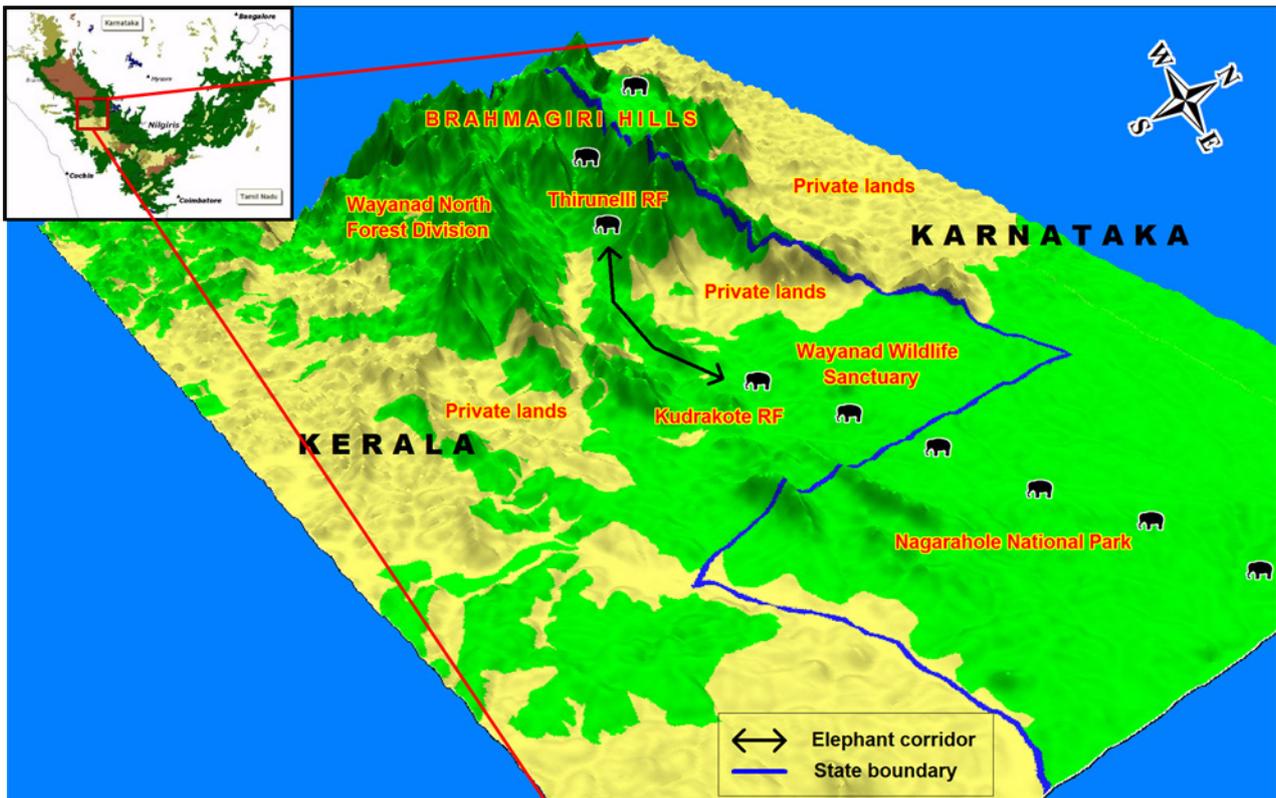


Figure 3.1: 3D map of the Thirunelli-Kudrakote Elephant Corridor

Of the various options for securing human welfare and elephant conservation, a number of civic consultations and scientific studies have showed that in cases like this, the voluntary relocation of humans becomes key. A study on human-wildlife interaction in Wayanad Wildlife Sanctuary (Easa and Sankar, 2001) revealed that 75% of the reported wildlife conflict incidents were due to elephants. In a study conducted by Kerala Forest Research Institute (KFRI) in 2009, it was found that one of the major settlements inside Wayanad Wildlife Sanctuary had expressed their willingness to relocate (TOI News, Nov 2018).

All this was set in the context of a relatively new wave of consciousness among conservationists and governments that people have to be empowered stakeholders in the whole process of wildlife conservation. Conventional wisdom for Protected Area management globally is primarily based on the concept of habitat preservation by setting aside human-free zones that ensures minimal human interference so that nature can sustain itself (Terborgh, 2000; Karanth and Karanth, 2007).



Figure 3.2: Elephant footprints through a crop-field in Wayanad

The fundamental objective of human-free zones is to conserve wildlife-specific habitat for the survival of threatened and endangered species and to reduce human-wildlife conflict (Karanth and Karanth, 2007). Despite broadly following this wisdom while planning India's modern PA system in the 1970s (Ranjitsinh MK *pers. comm*) the reality is that there are people living inside two-thirds of the country's PAs (Kothari, 1997). Large-scale displacement of local communities from inside Protected Areas, often termed as 'fortress' conservation (Cernea and Schmidt-Soltau, 2003), has resulted in misery and impoverishment for marginal communities (Rangarajan and Shahabuddin, 2006). Besides, a number of studies argue that a conservation mechanism that fails to recognise the rights of local communities undermines indigenous knowledge systems, and limits local peoples'

participation in the decision-making process, further intensifying biodiversity loss (Fairhead and Leach, 2003; McLean and Straede, 2003).

Lack of adequate emphasis on livelihood restoration and resettlement planning has often triggered social unrest including violent ultra-movements in many sanctuaries and reserves across the globe (Vasundhara, 2006; Dash and Behera, 2012; Kumar and Kerr, 2013), whereas conservation-driven voluntary relocation is known to have resulted in improvement of livelihood when it involves the local communities in the management of forest resources within a well-defined institutional framework (Dash and Behera, 2015).

Therefore, it is now an accepted construct that effective biodiversity conservation must be led by local communities and that the government



must be cognizant of their wishes and needs. In addition, where relocation of humans is critical for wildlife conservation, such relocation must be voluntary and will be effective only if it is combined with a strategy of bringing all the stakeholders together, including the local community, to participate in the decision-making process (Torri, 2011; Dash, 2016) (Fig 3.3).

This was the backdrop when the Wildlife Trust of India, in collaboration with the Kerala Forest Department and local communities, and with financial support from Elephant Family, World Land Trust and IUCN Netherlands, initiated a project in 2005-06 under its Wild Lands Division to secure the Thirunelli - Kudrakote corridor.

3.2 Voluntary relocation as a strategy for restoring wildlife connectivity and reducing human-wildlife conflict

The project was initiated in the target area in April 2005 with the aim of securing the corridor under the 'Private Purchase Model' by acquiring land owned by the villagers, either by payment of the agreed value (in the case of non-tribal or non BPL³ families) or by providing suitable alternate land and resettlement packages (for BPL families or tribals). It was clear from the outset, that any village or resident who did not wish to move would not be targeted. This was the case with the village of Edayur Vayal, which was left out of the plans when the main landholder expressed



Figure 3.3: Livelihood and capacity building training of local communities in Wayanad

³ BPL: Below Poverty Line

he was unwilling to sell, largely for commercial benefit. After due processes, WTI accepted this landholder's reluctance to sell the land and stopped all activities in that community. The land acquired from those relocated people who would voluntarily choose an alternative means of living, was to be acquired by WTI and then handed over to the Forest Department to be notified as a part of the Wayanad Wildlife Sanctuary. A total of 25.3 acres of land were purchased from 37 families in four corridor villages by WTI, although they actually occupied over 50 acres of land. In addition to this, partner NGO, Asian Nature Conservation Foundation (ANCF), had purchased 12 acres of land from the Sulthar Vayal village.

To achieve this objective, the implementation strategy involved the following steps:

1. Developing a working partnership between WTI and the Kerala Forest Department to protect the elephant corridor and habitat.
2. Working with local communities, understanding their issues with human-wildlife conflict, explaining the benefits of wildlife corridors, especially from the point of view of reducing human-elephant conflict and winning community support.
3. Holding regular consultative meetings with the corridor resident families to obtain their consent, terms and cooperation for voluntary relocation and resettlement.
4. Assisting in the identification of land, constructing homes and basic facilities and in the smooth relocation of the villages.
5. Legal demarcation of corridor and initiation of legal protection, under the existing laws in India.
6. Assisting the relocated families with alternate livelihoods and post relocation

support and monitoring to ensure complete social parameter success in the project.

7. Post-securement ecological monitoring of elephant and other wild animal movements to monitor use of the corridor and plant regeneration of vegetative cover.

3.3. The Pre-Relocation Process

3.3.1 The Assessment

The following aspects were considered while assessing the process for relocating families:

- Assessment of the socio-economic condition of the people living in the area by a team of sociologists.
- Implementation of entry-point activities like village-level community support to win the confidence of the people based on discussions and taking into account various local dynamics.
- Consultations on issues affecting their lives (human-wildlife conflict, educating of children, lack of facilities such as electricity, etc.) and how the project could work towards improving those aspects. The possibility of relocating to an alternate place was then discussed as a positive option for the community. The process was initiated only after everyone in that community understood the issues and agreed to relocate.

Both primary and secondary data were collected during this phase. Primary data were collected on the extent of corridor usage by elephants, habitat quality, traffic intensity on the roads bisecting the corridor, corridor connectivity between habitats, corridor dependent villages, socio-economic status of the people and peoples' perception for securing the corridor land (Fig 3.4 and 3.5).





Figure 3.4: Ground-truthing of the corridor



Figure 3.5: Survey in villages by the WTI team

Secondary data were collected from the elephant census and from the human-elephant conflict cases recorded by the Forest Department. This was used to estimate the elephant population conflict trend in and around the corridor. Other details such as landholder's name, extent of property and legal status of the land were collected from the Village Administration Officer (VAO) of the respective corridor area. The ground truthing of the Thirunelli-Kudrakote corridor identified five villages with 37 families which were in the corridor and on the direct path of regular elephant movement (Table 3.1 and Fig 3.6).

3.3.2 Understanding and Statutory Compliance of Relevant Laws

Because there are many laws that govern the relocation of people away from forests and other areas in India, it was very important to consult them before initiating the process, especially as it involved tribal and forest dwellers. Some of the relevant laws which the project had to comply with were:

- National Policy on resettlement and rehabilitation for Project affected families 2003 (NPRR-2003): applicable for projects displacing 500 families or more *en masse* in plain areas and 250 families *en masse* in hilly areas, Desert Development Programme (DDP) blocks, areas mentioned in Schedule V and Schedule VI of the Constitution of India
- The Scheduled Tribes and other traditional forest dwellers Act 2006 Section 4(2) d,e,f
- The National Rehabilitation and Resettlement Policy 2007. Mostly for cases of the involuntary displacement of people (does not have much relevance to small voluntary relocations)

- The Land Acquisition, Rehabilitation and Resettlement, 2011
- Rehabilitation plan of Project Tiger for relocation from Project Tiger Areas.

3.3.3 Consent for rehabilitation, Land purchase and Registration

For land purchase, WTI followed the Land Acquisition Act, 1894*. Once the alternate land was identified for relocation, the first step was to get the land records verified by a lawyer. This was followed by signing an agreement between the parties involved in the transaction. The agreement covered the following basic details and was drafted by a lawyer:

- Particulars of the alternate land to be purchased
- Agreed cost of the land between seller and buyer
- Advance amount to be given by the buyer
- Time span during which the sale of the land should take place
- Procedure to be adopted if any of the parties breach the agreement
- How the losses are to be covered if any of the parties are found to be at fault

The next step was to obtain a title deed prepared by a government licensed "Document Writer", followed by the land registration at a sub-registrar office. WTI ensured that the title deed was registered within the time limit mentioned in the agreement. Other documents required for registration were the original title deed, previous deeds, property tax receipts (these documents had to be previously verified by the legal advisor of WTI).

*now known as *The Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act, 2013*



Table 3.1 Beneficiary villages identified in the corridor

S. No.	Identified Villages	Latitude	Longitude	Range	Sanctuary
1	Thirulakunnu	11°53'48.1596" - 11°54'7.002"N	76°3'37.3536" - 76°3'54.1944"E	Tholpetty Range	Wayanad Wildlife Sanctuary
2	Valiya Emmadi	11°53'28.0932" - 11°53'35.3148"N	76°2'55.6152" - 76°3' 7.6824"E	Tholpetty Range	Wayanad Wildlife Sanctuary
3	Kottapady	11°53'47.49" - 11°53'55.6872" N	76°1' 53.1012" - 76° 2' 0.096"E	Begur Range	North Wayanad Forest Division
4	Puliyankolly	11°53' 55" - 11°54'8"N	76°1'3" - 76°1'15"E	Begur Range	North Wayanad Forest Division
5	Sulthar Vayal	11°53' 39.16"N	76°2'7.16"E	Tholpetty Range	Wayanad Wildlife Sanctuary

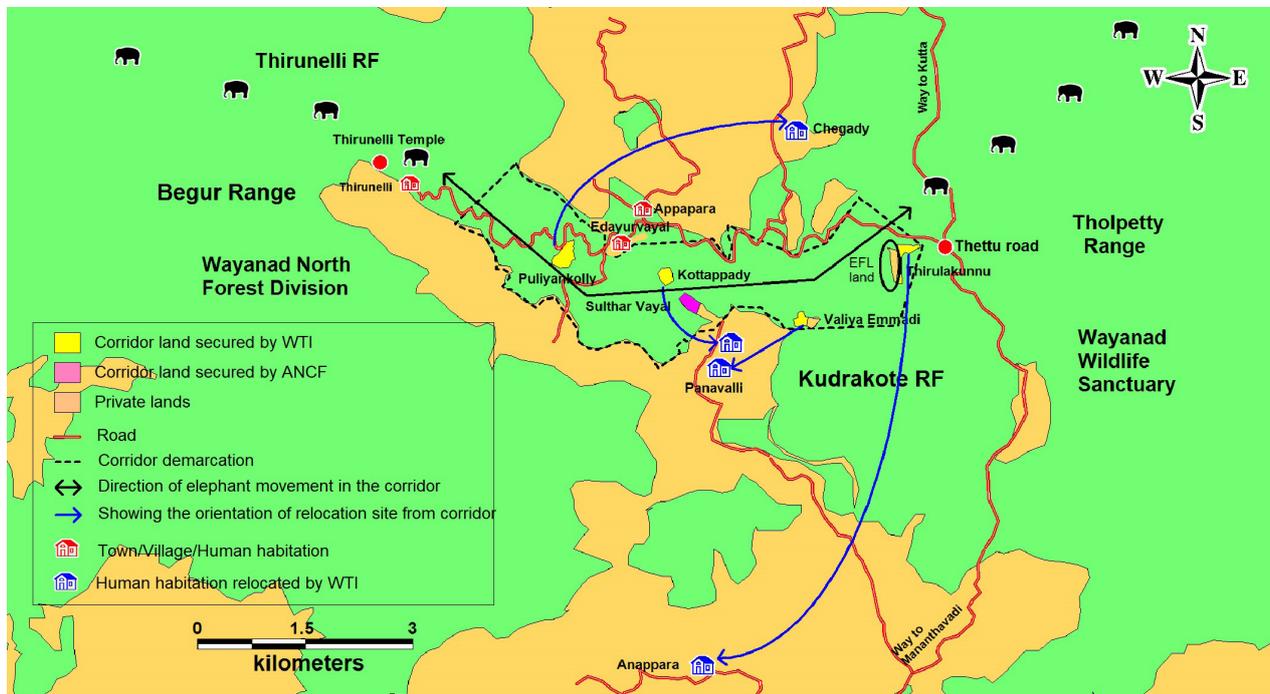


Figure 3.6: Map showing the location of five villages pre and post relocation

Since the majority of land in this corridor belonged to a tribal community, there was a restriction on selling land directly⁴ – instead it had to be in exchange for alternative plots of land. Official permission was therefore required from the District Commissioner/District Collector of Wayanad District together with the written consent of the villagers to be relocated was required to apply for this permission.

The process followed was:

- Obtaining the consent of the tribal land holder (Fig. 3.7)
- Identification of alternate land in consultation with the land holder
- Verification of land record and base document by Village Officer and Registration office

- Requesting permission from the District Collector with all the above documents explaining the reason for purchase
- On receipt of the permission, registration of alternate land in the name of the tribal person, and registration of the vacated tribal land in the name of Wildlife Trust of India (which was later transferred to the Forest Department)

3.3.4 Preparing the Relocation Plan

Voluntary relocation of the villagers

- The final decision to go ahead with a specific relocation package and plan was taken strictly on the basis of ‘Prior Informed Consent’ of the families concerned.



Figure 3.7: Signing consent letters with the corridor dependent villagers

⁴ The Fifth Schedule of the Indian Constitution prohibits or restricts the transfer of land by or among members of the Scheduled Tribes in an area. Also, Section 3 of the Scheduled Caste and Scheduled Tribe (Prevention of Atrocities) Act, 1989 safeguards the rights of tribal people by preventing any land, owned by or in the possession of or allotted to, or notified by any competent authority to be allotted to, a member of a Scheduled Tribe to be acquired by any other party. Land owned by a member of a Scheduled Tribe cannot be purchased and can only be exchanged for alternate land.



- A needs assessment survey was completed using a participatory process to determine the needs of the community/area, based on the principle that communities should ideally be relocated as a whole, and social ties should not be affected by the process of relocation. This is to ensure that after relocation, their social and cultural identities are safeguarded.
- The needs were then prioritised through a participatory process to identify the schemes available to meet specific social and/or economic needs, the costs and impacts associated with these strategies, and to identify the optimum strategy based on the financial resources available.
- Based on the above needs, the relocation package was prepared, which in most cases followed a 'land for land' strategy. In cases where the land holding was too small, a reasonable minimum extent of land was provided for each family.
- Efforts were made to provide the same area of land for dwelling as the beneficiaries owned previously.
- Families who had agricultural land were provided with an equal amount of agricultural land with irrigation facilities.
- Basic amenities like drinking water facilities and an approach road to the relocation site were provided in the package
- The beneficiary families were provided with assistance help to move their household goods to the new houses.
- In cases where people were not financially well off, additional livelihood support was also provided and other assistance facilitated from government schemes.
- Based on the consent of the community to be relocated, and agreement to the relocation plan and alternate relocation site map, permission was requested from the District Commissioner/District Collector for the tribal families to be relocated.
- The families were relocated once the permission was obtained, alternate land purchased and houses and other amenities constructed/provided.



Figure 3.8: Discussion with the villagers to obtain their consent for relocation

3.4 The Relocation Process

3.4.1 Thirulakunnu Village

The total extent of agricultural land and residential land identified in Thirulakunnu village was 20.5 acres owned by seven households. A total of 26 individuals (with equal number of men and women) in four households resided in the path of elephant movement (Table 3.2).

3.4.1.1 Negotiation for relocation

After several rounds of discussion and negotiations (Fig 3.9) the idea to move out of the corridor to an alternate land area was proposed by the villagers themselves. They felt that moving out of the forest would be a win-win situation for both the people and wildlife and would allow unhindered movement for animals. Taking up the suggestions of the

Table 3.2 Population of Thirulakunnu

All Males	All Females	Boys (Age <15 yrs)	Girls (Age <15 yrs)	Men (Age >16 yrs)	Women (Age >16 yrs)
13	13	8	6	5	7



Figure 3.9: Negotiation for relocation with villagers



villagers, the Wildlife Trust of India agreed to voluntarily relocate them to an alternative place of their choice outside the corridor. Written consent was obtained from the four identified households for voluntary relocation for the release of 9.1 acres of land.

3.4.1.2 Identification of alternate land

Along with the WTI team, the beneficiaries themselves identified and shortlisted four potential alternate sites. The beneficiaries selected Anappara, near Kartikulam town and 8 km from Mananthavady, as the relocation site. The villagers' preference was based on several criteria including availability of dry and irrigated lands (cultivable land), distance

from their kin, temples, education, health care facilities, etc. The agricultural land identified had good irrigation facilities and was adjacent to the place where their housing was proposed.

3.4.1.3 Land registration

The alternate land in Anappara was bought and transferred into the names of the four households targeted for relocation. In June 2006, the corridor land owned by these households was then registered in the name of WTI. Of the 9.1 acres of land, 4.9 acres were under lease from the Forest Department. The owners gave their consent in writing to the Forest Department for surrendering the leased land.



Figure 3.10: Joint land survey in Thirulakunnu village by Forest Department and Village Officer

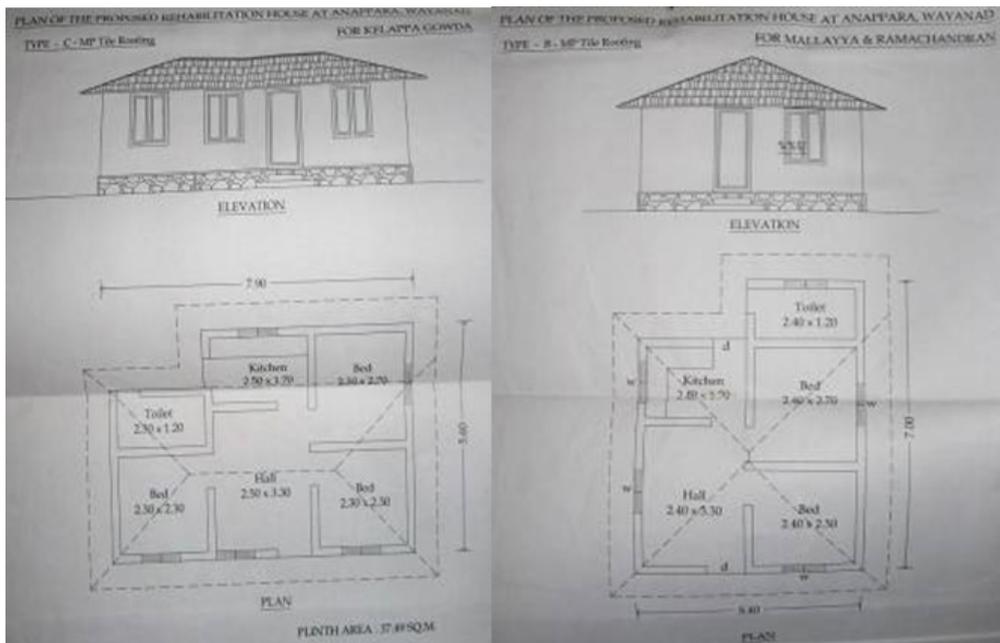


Figure 3.11: Plan of house constructed at Anappara for families from Thirulakunnu

3.4.1.4 Construction of new houses and community infrastructure

Tiled houses were constructed at Anappara for each of the four households. The size of the new houses depended on family size, size of previously owned house in Thirulakunnu and some other personal requirements that had emerged from earlier sociological interactions with the villagers (Fig 3.11). The houses were

not built in a cookie-cutter fashion but had individual design elements. Other infrastructure and facilities included a common well for water and a road for connectivity. The main road and bus stop were within 200 m from these new houses. Other facilities such as a school, health centre, bank and market were within 5 km of the resettlement site.



Figure 3.12: Old and new house of the villagers of Thirulakunnu





Figure 3.13: Agricultural land provided at Anappara



Figure 3.14: Villagers harvesting crop (left) and a well being constructed for drinking water (right)



Figure 3.15: Vacated land taken over by elephants and other wild animals

3.4.1.5 Relocation to alternate land

Four families were voluntarily relocated to an alternative site at Anappara near Kartikulam. The keys and documents of ownership for new houses and land handed over to the villagers on April 30, 2007 by Mr K.C. Kunjiraman, the local MLA (Member of the Legislative Assembly). The event was also attended by Gram Panchayat members, the Chief Conservator of Forests, Wildlife Warden and other people from the conservation community. Apart from houses, the villagers were also provided with drinking water and other civic facilities. Land for agriculture was also provided adjacent to their houses (Table 3.3).

3.4.1.6 Handing over acquired corridor land to the Forest Department

9.1 acres of acquired land including 4.9 acres that were surrendered from lease from the Forest Department were transferred to the Forest Department to be included as part of the Wayanad Wildlife Sanctuary for which a formal MoU was signed on December 20, 2007 between WTI and the Kerala Forest Department.



Figure 3.16: The local Member of the Legislative Assembly (MLA) handing over keys for the new houses to householders



Table 3.3: Comparative pre and post relocation status of Thirulakunnu/Anappara village

S. no.	Parameters	Pre-Relocation (Thirulakunnu village)	Post Relocation (Anappara village)
1	Location	Living within the forest with high human wildlife conflict	Away from the forest with low human – wildlife conflict
2	Drinking Water	Source of drinking water was streams and hence prone to water borne diseases	Clean drinking water from well
3	Source of Livelihood	Agriculture and limited opportunities for daily wage labour. Pay was low	Agriculture and daily labour. Being closer to the town, more work as daily labourers with better pay. Using new agriculture methods
4	Forests Dependency	Grazing cattle, firewood and non-timber forest product (NTFP) collection and occasional fishing	Cattle stall fed with good income from dairy products. Firewood collected from own land and nearby markets. No fishing or NTFP collection
5	Agriculture	Cultivated paddy, ginger, seasonal vegetables. Plantation crops e.g. coffee, pepper, areca nut, coconut, cocoa, jackfruit and mango	Agriculture on their own land for paddy, seasonal vegetables. Plantation crops: coffee, pepper, areca nut, coconut, jackfruit, mango, banana and pineapple
6	Crop Depredation	Very high by elephants, wild pig, sambar, spotted deer and bonnet macaque. Considerable expenditure on crop damage mitigation (fireworks, trenches etc.)	Not much damage except some by wild pigs
7	Road	No access to roads	Access to a road
8	Access to Govt. Officials	No	Good rapport with government agency
9	Electricity	No electricity	Electricity connection enabling them to own and use electrical and electronic goods including TV, motor pump, etc.
10	Educational and recreational facilities	These facilities were more than 5 km from the village	Aanganvady, Lower Primary Aanganvady ⁵ & Higher Secondary School, Gram Panchayat, Forest Office and Club within 2 km radius

⁵ Aanganvady: Child Care Center

Learnings from the First Roadblock and Remedial Measures Taken

While discussions were ongoing to buy the entire Thirulakunnu settlement, about 11.3 acres of land owned by three households were sold to a private tourism company who purchased the land with the intention of constructing a tourism resort at Thirulakunnu. There was mala fide intent in this with possible collusion of a retired forest officer and the transaction happened with the intention of raising the price of land and making easy money as the land was an elephant corridor. WTI could not purchase the land in spite of repeated requests.

After several rounds of negotiations failed with the new land owners, WTI and the Forest Department took a joint decision to stop trying to acquire that piece of land. Instead, the land was declared as 'Ecologically Fragile Land'⁶ by the State Forest Department upon request of Wildlife Trust of India. This ensured that no further development would take place on that land which could hinder elephant movement.

3.4.2 Valiya Emmadi

There were six households with 33 individuals (Table 3.4) residing in 12.8 acres of corridor land, of which two belonged to non-tribal families and four belonged to members of the Kattunayakan tribe, a hunter-gathering tribe of Kerala. These households were relocated to Panavally, a village 5 km away, in Thirunelli Panchayat, Mananthavady Taluk.



Figure 3.17: Household in Valiya Emmadi pre-relocation

Table 3.4: Population of Valiya Emmadi

	Male	Female	Total	Boys (Age<15 yrs)	Girls (Age<15 yrs)	Men (Age 16+yrs)	Women (Age 16+yrs)
Non-tribe	9	10	19	5	4	4	6
Tribe	6	8	14	3	3	3	5
Total	15	18	33	8	7	7	11

⁶Any forest land or any portion thereof held by any person and lying contiguous to or encircled by a reserved forest or a vested forest or any other forest land owned by the Government and predominantly supporting natural vegetation (under Section 4 of the EFL Act)



3.4.2.1 Negotiation for relocation

The successful relocation of people from Thirulakunnu village to a site outside the corridor and the resulting improvement in their livelihoods was a motivating model that paved the way for negotiation with villagers from other corridor villages. Human-elephant conflict was a major problem in Valiya Emmadi, so when the WTI team started discussions with the villagers, they were open to the proposal, having seen the successful relocation of people from Thirulakunnu. Negotiations to purchase 12.8 acres of identified land parcels from Valiya Emmadi were made with all six households who later gave their written consent for voluntary relocation, having understood the benefits after participating in a series of meetings. However, when the records were checked, only 6.1 acres of the 12.8 acres of land was available for purchase. The remaining land was under dispute between landowners and the Revenue Department. The available land was purchased in 2007. For the remaining land, WTI asked the Revenue Department to settle the dispute so that the corridor land could be secured. The major portion of identified land was owned

by a non-tribal household, some of which was disputed. After consulting the state's Revenue Department, an agreement was signed to sell the land to WTI at a market rate agreed by both parties. The four tribal households also agreed to sell their land.

Based on the socio-economic assessment and discussion with villagers and the Forest Department, a relocation package was prepared. The package for each family included 0.125 acres of land, a new house and a common well for four families in Panavally village which was around 2 km away from the original settlement. The other two non-tribal households accepted a package including 0.25 acres of dry land, a new house per family in Panavally and water connection.

3.4.2.2 Identification of alternate land

Having consulted villagers in line with its strategy, WTI shortlisted two alternate areas of land for villagers who wanted to move. They chose the land in Panavally which was just 2 km away from their current settlement and had better connections to other facilities.



Figure 3.18: Alternate land at Panavally

3.4.2.3 Permission to relocate households and register land

Since permission from the District Collector was mandatory for the land purchase and relocation of four Scheduled Tribe families, the required documents (consent letters, agreement copy, relocation package etc.) were submitted to the Collector for his permission in November 2007. The field officer met the Additional District Magistrate for approval and the file was sent to the *Tehsildar* (administration at block level) and then to the Village Officer for verification of records in January 2008. Certain clarifications were sought by the Village Officer which were collected from the settlers and legal department and then submitted. The District Collector of Wayanad granted his permission for the relocation in February 2008. 6.1 acres of land were purchased in the corridor area at Valiya Emmadi from Mr. A. Moidu though the remaining 6 acres of land remained disputed. This dispute was later settled by the Revenue Department and of this, 2.5 acres were allotted to Mr. Moidu and remaining land was acquired by the Government. Mr. Moidu's land (2.5 acres) was registered in April- early May 2008. The alternate land in Panavally for the six families was purchased and simultaneously registered in the name of the villagers.

3.4.2.4 Construction of new houses and community infrastructure

As per the agreed package for relocation, six houses were constructed for the relocated households. Also as agreed, a common well was provided for four families and a water connection for the remaining two. It took almost a year for the houses to be constructed (Fig 3.19).

3.4.2.5 Relocation to alternate land

The keys and land documents of the houses were handed over to the beneficiaries on 1st April, 2009 in a function held at Panavally with representatives from State Forest Department, World Land Trust and Elephant Family. Founder and CEO of WTI, Mr. Vivek Menon acknowledged the contribution of the villagers, state government and donors in facilitating the relocation and subsequent securement of corridor land. The families were delighted with the new houses.

*Mr Kenchan, one of the beneficiaries said
"You have come like a God for us. The new houses will save us from the constant threat from elephants that regularly came to our farm lands and we were forced to stay in our house and keep quiet till the time they left".*



Figure 3.19: New houses being constructed (left) and a well used by the householders (right)



Ms Zainaba another beneficiary was also happy to receive her new house and when Mr. David (one of the photographers from WLT) turned his camera lens towards her, she said *“If you want pictures of elephants, come to my house and you will see elephant foot prints all around. Stay one night in the village and you will see them through your lens too”*.

The old houses at Valiya Emmadi were demolished in February 2010 to clear the corridor of any structures that might hinder the movement of elephants and to prevent re-occupation by people. A statue of an elephant along with a plaque acknowledging the people/ organizations who have contributed to make

the relocation and securing of corridor land a reality was also inaugurated at the new village site by Marie Chambers, John Burton, Simon Barnes of WLT and Vivek Menon of WTI (Fig 3.21).

3.4.2.6 Handover of acquired corridor land to the Forest Department

Once villagers were relocated to their new settlements, all the existing infrastructures were demolished from the corridor land. The process of land transfer and registration with the Forest Department saw some challenges because a large sum of money was needed for stamp duty. To avoid paying this, a special permission was granted by the state government.



Figure 3.20: Old house (Valiya Emmadi) and new house (Panavally)



Figure 3.21: John Burton (Founder, World Land Trust) cutting the ribbon of a new house at Panavally (left) and the commemorative elephant statue, with its list of contributors, being inaugurated

Table 3.5 Comparative pre and post relocation status of Valiya Emmadi/Panavally Village

S. no.	Parameters	Pre- Relocation (Valiya Emmadi vilage)	Post Relocation (Panavally village)
1	Location	Living in the fringe area of the forest with high human-wildlife conflict	Away from the forest with no human – wildlife conflict
2	Drinking water	Source of drinking water was streams and therefore prone to waterborne diseases	Clean drinking water from well
3	Source of Livelihood	Agricultural and limited opportunities for poorly-paid daily wage labour	Agriculture and daily labour. Being close to the town, they had more, better paid work as daily labourers
4	Forests Dependency	Dependent on forests for NTFP and fuel wood	No NTFP and fuel wood collection from the forest
5	Agriculture	No ownership of land. cultivated paddy, ginger, seasonal vegetables. Plantation crops such as coffee, pepper, areca nut, coconut, cuckoo, jackfruit and mango	Having own Patta land. Cultivation of banana, coffee, paddy, ginger, vegetables etc.
6	Crop Depredation	Very high by elephants, wild pig, sambar, spotted deer and bonnet macaque. Considerable expenditure on crop damage mitigation (guarding, firecrackers, trench etc.)	No crop damage due to wild animals
7	House	No proper house with amenities	House with one bedroom, hall, sit out, kitchen and toilet
8	Road	No proper road connectivity, only forest mud road	Panavally road in front of settlement with public transport services
9	Educational and recreational facilities	Located more than than 5 km from village	Aanganvady, Lower Primary & Higher Secondary School, Public Health Centre, Gram Panchayat, Forest Office within 3 km radius





Figure 3.22: Corridor area (as of 2017) after relocation of Valiya Emmadi

3.4.3 Kottapady



Figure 3.23: Smt. Lakshmi Avva in front of her old house

This settlement was deep in the forest interior and the total extent of the land in Kottapady was 9.4 acres of dryland. Of this, 8.4 acres were owned privately and rest of the area was revenue land⁷. The 8.4 acres to be purchased in the corridor only had one house, owned by an elderly lady, Ms. Lakshmi Avva, with Mrs Raichal Ravi and Mrs Sowmya Viswanatha (same

family) who had left the land vacant.

Lakshmi Avva, a non-tribal, had lived in her house for over 40 years. She had no children and had lived alone in the forest since her husband, a forest department staff member, died 17 years ago. She first moved into the area with her husband 40 years ago and continued living there even after being widowed, with virtually no protection or support, cultivating crops such as guava, coffee and pepper for subsistence. Running out of basic provisions meant a three-km long trek to the village of Appapara. On her way, she often saw tigers, leopards and elephants.

Unlike others living within the corridor, Lakshmi was not disturbed by human-wildlife conflict or interactions. She believed that the elephants never attacked her because 'they are essentially a form of the elephant-headed god in the Hindu mythology, Lord Ganesha'.

⁷ Revenue Land in this context includes all government owned lands and land leased by the government to the tenants for farming and conservation purposes



3.4.3.1 Negotiation for relocation & identification of alternate land

After intense dialogue and discussion, Lakshmi Avva agreed to sell the land to WTI for the corridor and was willing to move out of Kottapady provided she received 0.49 acres dry land, a house and INR 100,000. Lakshmi Avva took five years to reach the decision to move. Finally, in 2010 she relocated voluntarily to Panavally village. She had refused a number of people who approached her to buy her land for tourism and other purposes. Now, she was content to give up her land for wildlife conservation, especially for elephants, as she was sure it was meant for a good cause and she was happy with the way other villagers had been relocated and the benefits they had received. The alternate land was selected at Panavally which was a distance of 3 km from her settlement in Kottapady.

3.4.3.2 District Collector's Permission for Rehabilitation

The fact that Lakshmi Avva had been living in isolation for a long time inside the forest had been covered by the media, and was known to politicians. Therefore, permission was sought from the District Collector for her relocation. The Collector gave the permission

and instructed the State Forest and Revenue Department to monitor the process and render necessary help to Lakshmi as required.

3.4.3.3 Land registration

The identified 8.4 acres of uncultivated corridor land owned by Mrs Raichal Ravi and Mrs Sowmya Viswanathan (same family) and Ms Lakshmi Avva was registered in the name of WTI in 2010. Subsequently the alternate land plus a house at Panavally were registered in the name of Ms. Lakshmi Avva.

3.4.3.4 Construction of new house and community infrastructure

A reasonably new house equipped with water and electricity connection was purchased for Ms Lakshmi Avva. Facilities like a provision shop, bus stop and health care were now nearby, approximately 300m away.

A new house already existed on the alternate land purchased by WTI and didn't have to be built, so the relocation process was implemented quickly. On September 21, 2010 Lakshmi moved happily into her new house with the idol of Lord Ganesh in her hand, though she was also sad to leave the forest she had lived in for decades (Fig 3.25). WTI and village officers helped her to



Figure 3.24: The WTI team and Ms Lakshmi Avva discussing the relocation and the latter signing the consent letter.



3.4.3.5 Relocation to alternate land



Figure 3.25: Lakshmi Avva going to her new house with an idol of Lord Ganesh and outside her new house



Figure 3.26: Dan Bucknell from Elephant Family and Sandeep Kr Tiwari, Sabu Jahas WTI handing over the mutation papers to Lakshmi Avva

move in her new house in Panavally where the villagers already knew her.

At the alternate site, Lakshmi could earn a minimum annual income of INR 20,000 from coffee, pepper and coconut cultivation on her fertile 0.24 acre plot.

“I thought I would never get the chance to live outside the forest with some good land and a respectable house at this old age. But WTI made it possible and I really appreciate that they turned my wishes into reality”

- Lakshmi Avva

Final formalities of the land donation to Lakshmi Avva were completed on 29 November, 2010. Lakshmi’s old house at Kottapady was demolished after she moved to her new one, allowing the free movement of wild animals. She passed away at the age of 76 after living in her new house for almost seven years.

3.4.3.6 Handover of acquired corridor land to the Forest Department

After relocation to Panavally, Lakshmi’s old residence and later the parcel of corridor land were transferred to the Forest Department.



Table 3.6 Comparative pre and post relocation of Kottapady/Panavally village

S. no.	Parameters	Pre-Relocation (Kottapady village)	Post Relocation (Panavally village)
1	Location	Living inside the forest with high human wildlife conflict	Away from the forest with no human – wildlife conflict
2	Drinking water	Source of drinking water was streams and hence prone to water borne diseases	Clean drinking water from well
3	Source of Livelihood	Pension, help from Forest Department and agriculture	Agriculture, pension and help from relatives. Being close to the town, she also received help from neighbours
4	Forests Dependency	Dependents on forests for NTFP and fuel wood	No NTFP and fuel wood collection from the forest
5	Ownership of land & Agriculture	Agriculture: seasonal crops plus coffee and pepper	Cultivating- Banana, pepper, Coffee, coconuts, Ginger, Vegetables etc.
6	Crop depredation	Crop depredation: very high animals responsible: elephants, wild boar, sambar, spotted deer and bonnet macaque	No crop damage
7	House	House with no proper amenities	The house had two bedrooms, a hall, balcony, worship room, kitchen and bathroom, all with electricity
8	Road	No road connectivity only forest mud path	Panavally road in front of house with public transport services
9	Access to basic facilities	Not much accessibility while residing inside the forest	Access to all facilities e.g. the bank, post office, market and other government services until she died in 2017



3.4.4 Puliyanolly

The Puliyanolly settlement was situated in the Begur Range of North Wayanad Forest Division. It had 26 families living in 15 houses with a total population of 83 individuals (Table 3.7). All these households belonged to the *Urali Kurumbar* tribal community. The settlement was under Thirunelli Gram Panchayat in Mananthvady Taluk.

3.4.4.1 Status of land possession

Earlier the people of Puliyanolly had lived in the Tholpetty region, and had moved to Puliyanolly in 1969 as plantation labourers for the Forest Department. As they had been living in Puliyanolly for more than 25 years, the Government of Kerala had given the 'Record of Rights'⁸ to all 15 households in 1997. A total of 2.05 acres of land was given to 15 families in Puliyanolly with an Elephant Proof Trench (EPT) spanning an area of about 18 acres to

protect their 2.05 acres of land. Compensation packages for this village was different for each of the beneficiaries.

3.4.4.2 Negotiation for relocation

Negotiations with the identified beneficiaries were carried out through continuous discussions lasting about nine months (Fig 3.27). The topics covered were high human-elephant conflict in the area, poor health and education support and limited livelihood opportunities. This was one of the most challenging villages to work in due to very low education levels, poverty and poor living standards despite easy access to natural resources. The WTI team briefed them on how relocation had positively changed the lives of the people of Thirulakunnu and Valiya Emmadi villages. After negotiating for over a year, the villagers agreed to relocate outside the corridor forest (Fig 3.27).

Table 3.7 Population of Puliyanolly

Total Male	Total Female	Boys (Age<15 yrs)	Girls (Age<15 yrs)	Men (Age>16 yrs)	Women (Age>16 yrs)
40	43	11	13	29	30



Figure 3.27: Negotiations with Puliyanolly villagers (left), obtaining written consent for voluntary relocation (right)

⁸ Record of Rights (ROR) is an extract from the land records registers held by the Revenue Department of State Government. ROR contains complete information regarding the land or property and history of holders of land and is a vital indicator of the legal status of a land/property.





Figure 3.28: Alternate land for Puliyanakolly Village (left) and house construction (right)

The relocation package for each of the 15 families included 0.15 acres of dry land, 0.20 acres of wet land (for agriculture) and a house. The families of 11 married children were allotted 0.05 to 0.10 acres of dry land, who were to remain with their parents in the newly built houses and at a later stage, were to build their own houses on the land provided, with additional government support. The families accepted the package and gave their written consent for voluntary relocation (Fig 3.29).

3.4.4.3 Identification of alternate land

The beneficiaries decided to relocate to Chegady village as most of them were getting daily wage work in the Forest Department's Timber Depot at Edayur Vayal, which was about four kilometres away from the identified land. The alternate land also had facilities like health care, education institutions, shops and administrative offices nearby (Fig 3.28). Subsequently, agreements were signed with the landowners of Chegady, who agreed to sell the land to WTI for the relocation of the families from Puliyanakolly village.



Figure 3.29: Signing of agreements with landowners of Puliyanakolly Village



3.4.4.4 District Collector's Permission for Relocation

Based on the written consent for relocation obtained from the people, permission was sought from the District Collector to initiate the process. This was mandatory as all the targeted beneficiaries were tribal and their land rights are protected under the Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006. Before permission was granted, the facts put forward in the proposal were verified by a Village Officer. The Village Officer then visited Puliyanakolly in March 2009 to assess and collect written statements from each household, which were then passed on to the District Collector. It took time for the permission to be granted as the District Collector had to verify all the documents submitted, including Government records and personal inspection of the alternate land, to ensure that the implementation of the project was done according to tribal rights. Permission for the relocation of the Puliyanakolly villagers was received from the District Collector in mid-October 2009.

3.4.4.5 Land Registration

After obtaining permission to relocate, 6.42 acres of alternate land were purchased in Chegady and registered in the names of the relocated families during October 28th – 30th, 2009. On the day of the land registration at

the Revenue Office in Mananthavady, all the beneficiaries were traditionally dressed and celebrated the occasion like a festival.

Mr. Rajendran, one of the villagers from Puliyanakolly thanked WTI for helping his family move out of the corridor forest saying, "this will not only help the Aana" (elephant is known as Aana in Malayalam, the local language) "but will also save us from crop depredation and constant threat to life and property".

3.4.4.6 Construction of new houses and community infrastructure

After registration of the land, the construction of 15 households in Chegady began on November 15, 2009 with the beneficiaries offering 'Bhumi Pooja' (prayers for good luck and prosperity of the families and land), followed by the distribution of sweets to their near and dear ones. Each house had two bedrooms and a living room separate from the kitchen and toilet. Three public wells were constructed to fulfil their water requirements. Electrification of all the households was completed, and the electricity connection was provided by the government through the Gram Panchayat. For social development, a community club (Puliyanakolly Arts and Sports Club) was created and a community hall was provided for social gatherings.





Figure 3.30: Old (left) and new house (right) at Puliyanakolly and Chegady villages respectively

The second brief setback and lessons learned

The Kerala Government decided to give the legal forest rights to the Puliyanakolly villagers by giving them a 'Record of Forest Rights' for their existing land at Puliyanakolly [as per Schedule Tribes and other traditional forest dwellers (Recognition of Forest Rights) Act, 2006], i.e. legalising the land they were holding in the corridor area inside the forest. WTI appealed to Sub Collector and Chair Person, Sub Divisional Level Committee as this move was against the purpose of securing the corridor because the local communities were expected to give up their rights to own the forest land in the corridor in order to do that. Prior to the villagers' claim, WTI had approached them and gained their consent for relocation. Subsequently, compensation package was finalised and alternate land was also found. In this context, the villagers tried to claim lands from both parties. After various consultative meetings, a final Gram Sabha (meeting of the Revenue Department with villagers and Panchayat members) was held on 6th March 2011 by order of the District Collector (DC). The meeting decided that the villagers would not claim their land rights and the matter was amicably settled.

3.4.4.7 Installing an electric fence at relocation site

Although the relocation site at Chegady was further away from the main corridor area, it was close to a different forest area which elephants and other wild animals visited occasionally. Crop raiding and human-wildlife conflict had been reported in nearby areas and elephant movement was observed while the new village houses were under construction. An electric fence measuring 1.2 km in length was installed

in July 2011 (Fig 3.31). Electric fences are one of the most effective physical deterrents for wild animals. But in many cases, the fence stops working after a short time due to lack of maintenance. This is especially true when the fence is put up by multiple owners and no one takes responsibility for maintaining it. To overcome this problem and to ensure the effective maintenance of the electric fence, a committee of six people was formed at Chegady village charged with the responsibility of maintenance of the fence.





Figure 3.31: Electric fence at Chegady village

Members of this committee were trained in various aspects of the fence maintenance and functioning. Both theoretical and practical classes were organised for a day at Chegady. Along with the six committee members, other villagers also participated in the training program and committed to maintain the fence.

3.4.4.8 Relocation to alternate land

After construction of the houses and facilities for the targeted households, the people finally moved to Chegady on 2nd August 2011. Their keys and land records were handed over on the same day. Mr. Raja Raja Varma, Principal

Chief Conservator of Forests (PCCF) (WL) and Chief Wildlife Warden (CWLW), Kerala, Mr. D.K. Verma, Chief Conservator of Forests (CCF) Northern Circle, Mr. Dan Bucknell, Head of Conservation and Campaigns, Elephant Family, Dr. N.V.K. Ashraf and Dr. Sandeep Kr Tiwari from Wildlife Trust of India, Sri. Abdul Ashraf, President, Mananthavady Block Panchayat, Sri. O. R Kelu, President, Thirunelli Gram Panchayat, Block Panchayat Members, Divisional Forest Officers (DFOs), Range Officers and other Forest Department personnel, villagers from Puliyanakolly, Chegady, Panavally, Anappara, media personnel, local supporters of WTI and others attended the function. Over 200 people participated in the ceremony.





Figure 3.32: Handover function at Thirunelli Panchayat, Wayanad



Figure 3.33: CWLW Kerala (left) and President Mananthvady Block Panchayat (right) addressing the gathering





Figure 3.34: Mr Raja Raja Varma, CWLW Kerala handing over the land documents to the villagers

About 15 days after the villagers were handed over their houses, the families started moving to Chegady. This was an emotional moment for most villagers as many of them were born at Puliyanolly. In October 2011, once the people had moved, their old houses were demolished and the debris removed.

3.4.4.9 Handover of acquired corridor land to the Forest Department

After relocating people from the corridor, the corridor land was cleared of any hindrances to elephant movement and transferred to the Forest Department in 2011.



Figure 3.35: People from Puliyanolly moving their possessions to the relocation site at Chegady

3.4.4.10 Post relocation hand holding

At the Chegady relocation site, two wells were dug to cater for the needs of the 15 families voluntarily relocated there (Fig 3.36). Since the villagers needed more water to meet the requirements of 15 families and their 11 adult sons and families, they requested another well, so an additional well was built, which was perennial. The quality of water was good and the villagers were happy that water scarcity would no longer be a problem for them.

Smokeless cook stoves, a cost-effective means of reducing wood-smoke and forest dependency were provided to all the 15 households at

Chegady. Between 2016-2018, through FERNs Naturalists Society, a local partner organization, numerous government schemes were linked to the relocated village at Chegady such as construction of a tribal library, supervised by the electrification of two houses which could not be provided earlier and housing for four additional families which joined the village after relocation.

A capacity building workshop on bamboo products as a means of alternate livelihood development was organised for the relocated families from Puliyanakolly through the URAVU Indigenous Science and Technology Study Centre.



Figure 3.36: Well at Chegady



Table 3.8 Comparative pre and post relocation status of Puliyankolly/Chegady village

S. no.	Parameters	Pre-relocation (Puliyankolly village)	Post-relocation (Chegady village)
1	Location	Living inside the forest with high human-wildlife conflict	Away from the forest with low human – wildlife conflict
2	Drinking water	Source of drinking water was streams and hence prone to water borne diseases	Clean drinking water from well
3	Source of Livelihood	Agriculture and limited opportunities for poorly-paid daily wage labour	Agriculture and daily labour. Being close to the town, they get work as day labourers and are better paid (Kerala and Karnataka)
4	Forests Dependency	Dependent on forests for NTFP and fuel wood	No NTFP collection from the forest. Having smokeless <i>chulha</i> has reduced the firewood consumption
5	Ownership of land	Forest lease	Own land, both wet (for farming) and dry (housing)
6	Agriculture	Seasonal paddy, ginger and vegetables with coffee, pepper, areca nut, coconut, cocoa, jackfruit and mango	Banana, coffee, ginger, vegetables etc.
7	Crop depredation	Crop depredation was very high by elephants, wild pig, sambar, spotted deer and bonnet macaque. High expenditure on crop damage mitigation (guarding, firecrackers, trench etc.) No mitigation measures	None or marginal crop damage, having solar fencing to protect their crops from wild animals
8	Empowerment activity	No access to any empowerment activities	Self-help groups, medical camps, etc.
9	Connectivity	Isolated village	Good rapport with different government departments

10	House and electricity	Sub-standard house with no amenities or electricity	New houses with two bedrooms, a hall, kitchen, sit out and bathroom, all with electricity to allow for electronic goods like TV, mobile phone etc.
11	Road	No proper road connectivity only forest mud road	A road to the settlement with public transport services available
12	Educational and recreational facilities	Facilities for education and health were more than 10 km from village	Aanganvady, Lower Primary & Higher Secondary School, Public Health Centre, Gram Panchayat, Forest Office and Club are within 5 km radius



Figure 3.37: Elephants using the Puliyanakolly corridor land

3.4.5 Final legal protection of corridor

The entire corridor land has been accorded legal protection as part of the Wayanad Protected Area and Wayanad North Forest Division in a gazette notification issued by the Kerala Forest Department in 2015 (Annexure I).





Figure 3.38: Zainaba on her way to inaugurating her newly relocated house



Figure 3.39: L to R, Simon Barnes (leading journalist and writer), Vivek Menon (Founder and ED, Wildlife Trust of India) and John Burton (Founder, World Land Trust)

CHAPTER 4

MONITORING THE CORRIDOR: ECOLOGICAL ASSESSMENT AND MONITORING ITS USE BY ELEPHANTS AND OTHER WILDLIFE

*Ramith M, Ankita Gupta, AMA Nixon,
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The habitat utilization patterns of elephants have been widely studied in Asia (Sukumar, 1989; Sivaganesan, 1991; Barua and Bist, 1995; Baskaran et al., 2010). Their seasonal movements are related to the availability of water, suitable forage and shade (Sivaganesan, 1991; Baskaran, 1998). Asian elephants are generalists and feed on a variety of plants including grasses, shrubs, bamboo etc which vary depending upon the habitat and season. A study of free-ranging Asian elephants in wild regions of southern India established that 112 plant species were eaten, although just 25 species accounted for about 85% of the elephants' intake. The percentage of grasses versus shrubs eaten varies seasonally; the nutrient value of grass is greatest early in the wet season, while that of leafy shrubs is higher in the dry season (Sukumar, 1989). Generally, elephants use mixed deciduous and thorn forests for browsing during the dry season. Therefore, standing trees are critical food resources as well as being good shade for elephants while they move through corridor areas. Easa (1989) identifies habitat quality as the foremost environmental factor in determining the distribution of wildlife. Hence, the Thirunelli-Kudrakote corridor was monitored to understand the forest condition, anthropogenic pressures and wild animal movement. Before securement of the corridor, both primary and secondary data were collected during ground-truthing. Information was collected regarding extent of corridor usage by elephants, vegetation types and biotic threats like presence of grazing, felling, lopping or any other infrastructure presence. Encounter surveys were also undertaken on the forest trails and footpaths of the corridor area to record the availability of ecological resources for elephants such as fruit bearing trees, shade trees and natural mineral licks. The information on the availability of seasonal and perennial water sources was collected using questionnaire survey from local forest department field staff and tribal people.



4.1 Methodology

4.1.1 Habitat Quality and Availability of Ecological Resources

Vegetation surveys were carried out in March 2013 (post-relocation), in the dry season (Fig 4.1, 4.2), to assess the following parameters for the corridor:

- (1) tree species composition
- (2) availability of elephant food plant species
- (3) vegetation recovery after relocation
- (4) ground cover

The monitored area for this study comprised the four patches of land - Kottapady, Puliyanolly, Thirulakunnu and Valiya Emmadi - within the Thirunelli-Kudrakote elephant corridor that had been secured over the course of the project. All these secured areas are surrounded by forests. The forest type is moist deciduous and average annual rainfall is around 3,000 mm. It should be noted that villages were relocated across different time periods: Thirulakunnu was relocated in 2006, Valiya Emmadi in 2008, Kottapady in 2009 and Puliyanolly in 2011. In each secured area, five 10 x 10 m plots were laid randomly. All the tree species, number of individuals and their girth at breast height (GBH) were noted down for these plots. The

individuals with a diameter of less than 10 cm were considered indicators of regeneration. The density of different tree species was calculated as total number of individuals of that species divided by the total area surveyed.

4.1.2 Land Use Land Cover Analysis

The Land Use Land Cover (LULC) was assessed in and around a buffer area of 2 km of the Thirunelli – Kudrakote corridor using LANDSAT 8 imagery for 2018. Training samples were selected and the same class assigned to each set of similar spectral signature pixels. Google Earth Pro was used to verify that these pixels accurately represent one particular land cover class of interest. The LULC was divided into six classes: (1) moderate forest, (2) open forest, (3) water body, (4) barren land, (5) agriculture and (6) settlements. Supervised classification was performed using the Maximum Likelihood algorithm. After classification, the image was recoded to remove the mix pixel problem i.e. multiple classes contributing to the spectral response of a pixel, and the accuracy of the land use land cover was enhanced. The total area of each class of LULC was calculated using the number of pixels assigned to it.



Figures 4.1 and 4.2: Ecological data collection in the Thirunelli-Kudrakote corridor

4.1.3 Corridor Use by Elephants and Other Wildlife

The use of the Thirunelli-Kudrakote corridor by elephants was estimated using direct and indirect indicators of elephant presence before and after relocation of the four corridor villages. Data were collected every three months from January 2008 until March 2018. Permanent transects were laid in each settlement (referred to as corridor land) and in the Wayanad Sanctuary areas surrounding the corridor (referred to as corridor forest) to compare the movement in the corridor and the forest areas. To supplement the data collected on corridor use by elephants, census reports and data were obtained from natural forest tracts, which are very close to the corridor. Both block and water-hole count data were collected from the Forest Department to understand the demographic profile of the elephants.

Direct Method (Line Transect)

Direct elephant sightings along transects were used as a measure to estimate use of corridor and adjacent areas by elephants both pre- and post-relocation. From 2008 to 2012, the total length of transects covered was 49.25 km in the corridor land and 32 km in the corridor forest.

Indirect Method (Dung Encounter Rate)

An elephant dung encounter survey was carried out quarterly from 2008 to 2018 on transects of 1 km in each of the four corridor lands, and along 2 km trails in the corridor forest. During the survey, variables such as number of elephant dung piles and their status (very fresh, fresh, old, very old) were recorded.

Analysis

To examine whether dung encounter rate in the corridor varied with season and between sites, analysis of variance (ANOVA) was tested using software R. The possible impact of relocation and the subsequent securement of the corridor was also examined by modelling the securement of corridor sites as a dummy variable and performing linear regression.

The presence of other wildlife was studied using different methods including transect surveys and camera traps.

4.2 Results & Discussion

4.2.1 Habitat Quality and Availability of Ecological Resources

4.2.1.1 Ground Cover

The study revealed that ground cover varied considerably among the corridor lands and included grasses, herbs, weeds and barren ground. Dominant species included the grasses preferred by elephants i.e. *Themeda spp.*, *Digitaria spp.* and *Apluda mutica*. The percentage of barren area varied from about 7% in Valiya Emmadi to as high as 28% in Thirulakunnu. In the plots, the percentage of ground cover by invasive species *Lantana camara* and *Chromolaena odorata* was assessed.

The results showed around 25% of dry land in Thirulakunnu and Kottapady and 5% of dry land in Valiya Emmadi was taken over by invasive pioneer species. Puliyanolly was found to be least affected. The invasion of alien species shrinks the effective area available for elephants. In addition, invasive species such as *Lantana camara* and *Chromolaena odorata* are known to contribute to the modification of the ecosystem by adversely affecting the hydrological patterns, nutrient cycles and energy budgets which eventually affect the abundance and survival of native species (Ricciardi *et al.*, 2000). Reduction in the abundance of native species is expected to create a shortage of food, water and shade in the habitat and thereby drives the elephants to stray into the adjoining human habitations leading to conflict. With this background, a more pragmatic conflict mitigation and management plan should include monitoring the status of invasive species (e.g. their distribution, extent and implications for the ecosystem). Human impacts such as regular cattle grazing pave the way for alien species to invade.



4.2.1.2 Tree Species

A total of 47 species of trees were identified from the secured corridor lands, of which 31 are known elephant food species. Thirty species were identified in Kottapady, 19 species in Puliyaankolly, 20 in Thirulakunnu and 13 species in Valiya Emmadi (Annexure-II, Table 1). Within the survey plot areas, 14 species of established trees were observed in Kottapady, 16 in Puliyaankolly, 11 in Thirulakunnu and 13 in Valiya Emmadi.

Species composition: In Valiya Emmadi, Mango (*Mangifera indica*) and two exotic species- Mexican lilac (*Gliricida sepium*) and Silver oak (*Grevillea robusta*) - dominate in frequency (Annexure-II, Table 5). Maharukh (*Ailanthus triphysa*), Rose sandalwood (*Olea dioica*) and Mexican lilac (*Gliricida sepium*) are also abundant trees here. In Kottapady, Rusty kamala (*Mallotus tetracoccus*), True cinnamon (*Cinnamomum verum*) and Indian rosewood

(*Dalbergia latifolia*) are the most frequent species; species composition is more even here (Annexure-II, Table 2). Coffee plants are most frequent and abundant in Puliyaankolly followed by Mexican lilac (*Gliricida sepium*), Black siris (*Albizia odoratissima*) and Black plum tree (*Syzygium cumini*) (Annexure-II, Table 4). Coffee and Silver oak (*Grevillea robusta*) are the most frequent and abundant plants in Thirulakunnu (Annexure-II, Table 3). Tree density as well as species composition varies across the sites due to differences in previous land use, and different relocation timelines. The relative density of elephant food species varied among the corridor villages (Table 4.1 and Fig 4.3).

4.2.1.3 Regeneration and Recruitment

Considerable variation was observed in tree regeneration in the corridor lands (Fig 4.3).

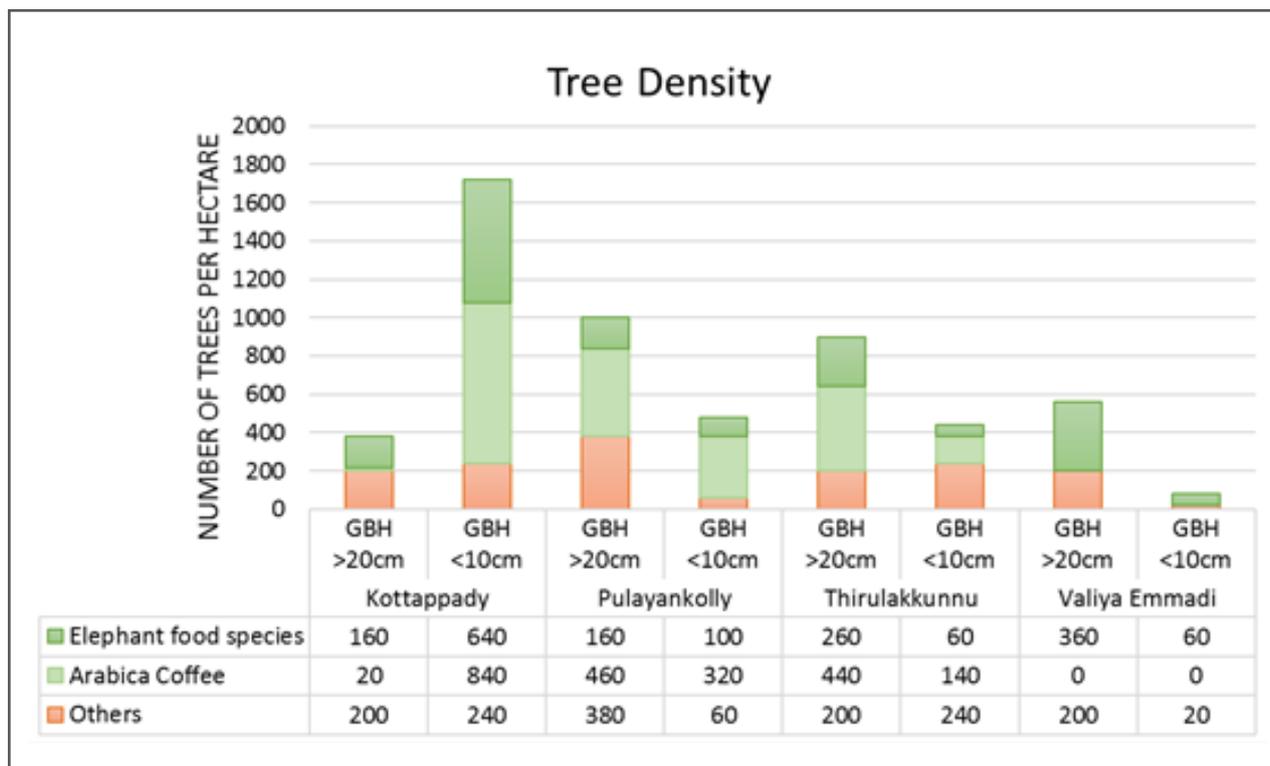


Figure 4.3: Tree density at the four study sites. Trees with GBH<10cm are considered indicators of regeneration and >20 cm are established trees. Note: Arabica coffee is also an elephant food species. However, it is shown separately since it may not give a true representation of habitat vegetation quality

Table 4.1: Number and relative density of elephant food tree species in Thirunelli-Kudrakote corridor

Corridor village lands	No. of tree species (in .05 ha) (GBH>20cm)	No. of elephant food species (in .05 ha) (GBH>20cm)	Relative density of food species (%)
Thirulakunnu	11	7	64
Valiya Emmadi	13	9	69
Kottapady	14	7	50
Puliyankolly	16	7	44

The density of regeneration was highest in Kottapady (1720/ha), however almost 50% of this was coffee plants. Puliyankolly had a regeneration class density of 480/ha, of which 67% were coffee plants. Thirulakunnu had a regeneration class density of 440/ha, of which 32% were coffee plants. Valiya Emmadi had the lowest density of regeneration class (80/ha), with no coffee plants.

Kottapady's high density of regeneration can be attributed to the fact that there was no agricultural activity here for several years before the relocation, and also since this settlement had only one resident. Puliyankolly and Thirulakunnu village sites had very low density of regeneration despite having high density of trees. *Lantana sp.* and *Chromolaena sp.* have

invaded around one quarter of the area of Kottapady and Thirulakunnu. Removal of these invaders may, however, have a negative impact in Thirulakunnu as it may lead to an increase in the cattle grazing here. In Kottapady, the eradication of these weeds can be tried out to further augment regeneration. In Thirulakunnu and Puliyankolly, around 70% of the area is wetland, hence regeneration may be unlikely and there may be need for assisted restoration through a plantation program. Valiya Emmadi had very low tree density as well as recruitment class. The low rate of regeneration can be attributed to the pressure of cattle grazing due to low tree recruitment in swamp area. Natural regeneration is slow in the corridor area and the tree diversity is low. Hence, it will take at least 10-15 years for succession to take place.



Figure 4.4: An established sapling where houses of Puliyankolly stood before relocation



4.2.2 Land Use Land Cover (LULC) mapping

The LULC classes for the area in and around the Thirunelli – Kudrakote corridor for 2018 are shown in Table 4.2 and Fig 4.5. The LULC map clearly shows that there are no settlements within the critical elephant movement path inside the corridor, testifying to the success of the corridor securement project. Furthermore, this data can serve as baseline for further studies examining land use change in this area.

A comparative change detection map (Fig 4.6) was also created to assess the zones where the maximum forest cover loss and deforestation happened between 1998 and 2018 in and around the corridor. There have been 351 cumulative hectares of deforestation over the two decades, primarily outside the demarcated corridor area.

Table 4.2: Extent of LULC types in and around Thirunelli – Kudrakote corridor in 2018

LULC Classes	Area (ha)-2018
Moderate Forest	1770.75
Open Forest	2669.09
Waterbody	69.61
Barren Land	187.44
Agriculture	587.80
Settlements	43.59

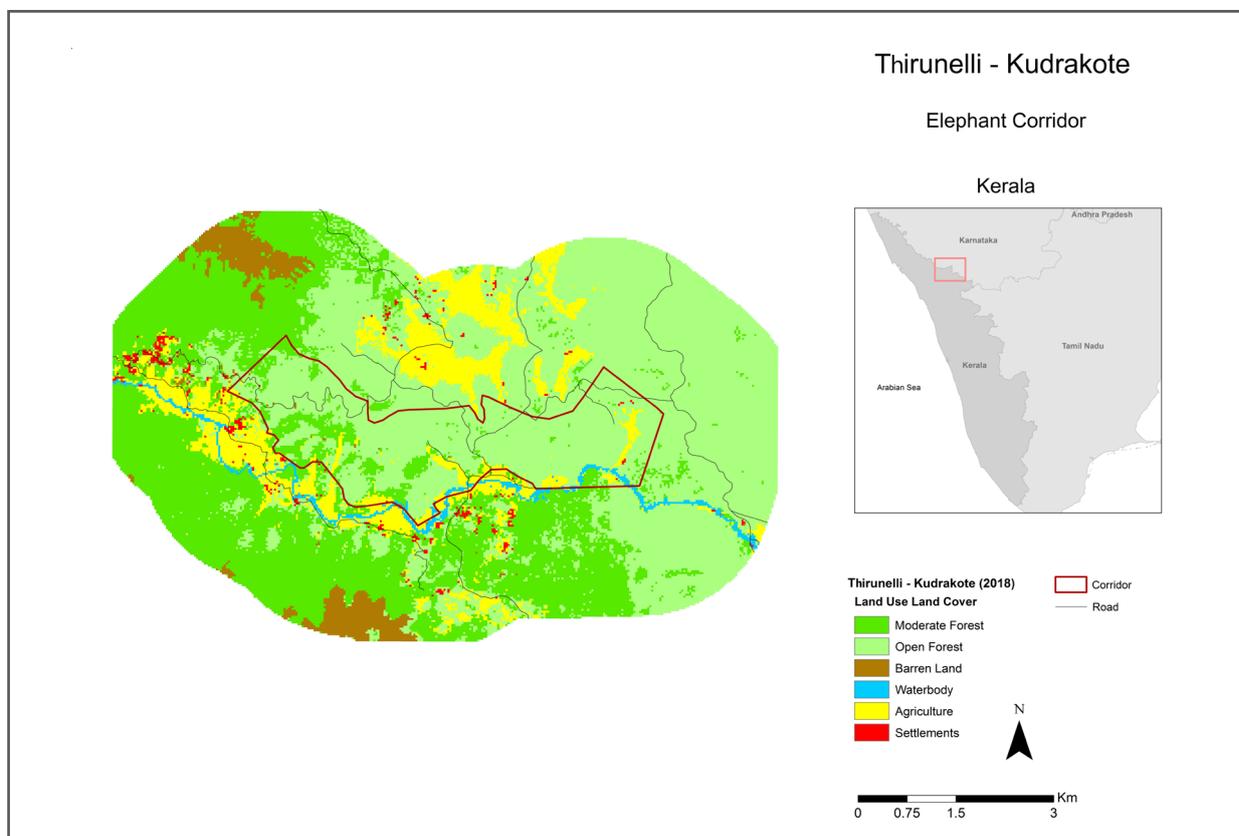


Fig 4.5: Map showing the LULC in and around the Thirunelli – Kudrakote corridor in 2018

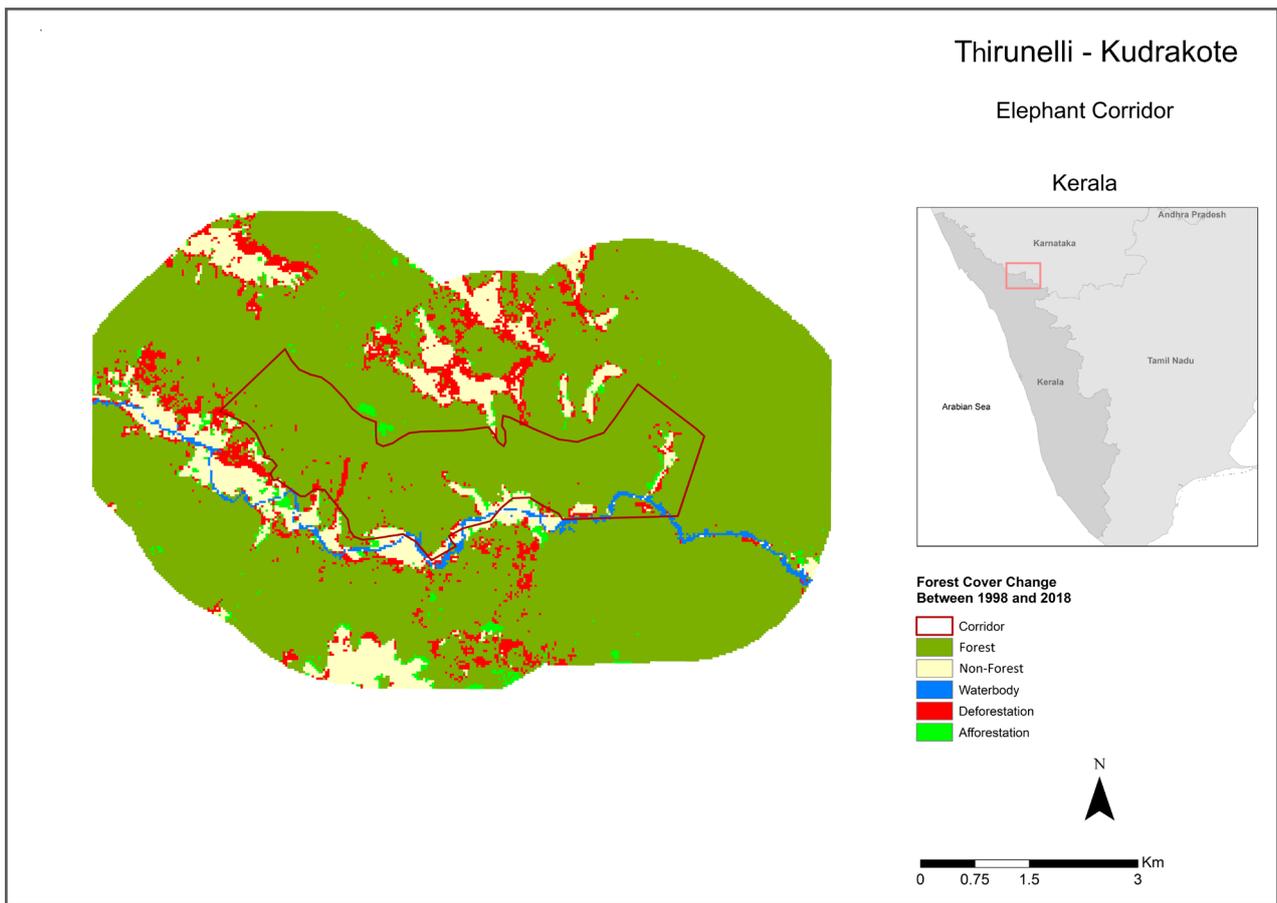


Figure 4.6: Forest cover loss detected between 1998-2018

4.2.3 Corridor Use by Elephants and other Wildlife

The use of corridor by wild animals is an indication of its functionality. Monitoring animal movement periodically was essential to ascertain the functionality of this corridor and also to assess whether securing this land in the corridor assisted in wildlife movement.

4.2.3.1 Corridor Use by Elephants

Direct Method

Table 4.3 gives a summary of direct elephant sightings between 2008 and 2011. The regular sightings suggest elephants frequently use the corridor (Fig 4.7).



Figure 4.7: Elephant herd in the secured corridor lands



Table 4.3: Summary of elephant sightings in Thirunelli-Kudrakote corridor (2008 to 2011)

Transect survey results (2008-2011)	Elephant sightings in corridor lands	Corridor forest
Total distance surveyed (km)	49.2	32
Total number of elephant sightings	122	52
Adult bull sightings	24	12
No. of herds recorded	18	10
Mean herd size	3.4	2.8
Largest herd size recorded	12	9
Elephant sighting density /km	2.5	1.6

Indirect Method

The average dung encounter rate in secured corridor lands from January 2008 to March 2018 was 21.79 (standard error of ± 1.57),

and in corridor forests it was 20.67 (standard error of ± 2.49). The dung encounter rate was also analysed across sites and seasons, and is summarised in Table 4.4.

Table 4.4: Mean dung encounter rate per km across study sites for different seasons Jan 2008-Mar 2018 (standard deviation in brackets)

	Dry 1 (Jan-Mar)	Dry 2 (Apr-Jun)	Dry (Jan-Jun)	Wet 1 (Jul-Sep)	Wet 2 (Oct-Dec)	Wet (Jul-Dec)	Overall (Jan 08 - Mar 18)
Thirulakunnu	21.92 (15.76)	12.79 (9.96)	17.36 (13.63)	14.53 (11.64)	15.05 (9.82)	14.79 (10.49)	16 (11.98)
Valiya Emmadi	29.8 (36.29)	19.21 (22.5)	24.5 (29.79)	7.5 (4.22)	7.09 (3.4)	7.29 (3.73)	15.44 (22.15)
Kottapady	27.3 (13.64)	21.59 (10.68)	24.44 (12.24)	16 (8.85)	24.32 (10.53)	20.16 (10.26)	22.3 (11.39)
Puliyankolly	39.65 (48.01)	33.23 (30.79)	36.44 (39.26)	27.8 (25.42)	25.48 (27.04)	26.58 (25.57)	31.38 (32.86)
Corridor lands	29.67 (31.14)	21.7 (20.91)	25.69 (26.64)	16.17 (15.75)	17.82 (16.73)	17.01 (16.17)	21.2 (22.22)
Corridor forest	28.95 (22.68)	16.58 (14.6)	22.35 (19.18)	15.56 (10.32)	20.05 (12.29)	17.81 (11.21)	20.01 (15.48)
Total	29.55 (29.69)	20.77 (19.87)	25.11 (25.44)	16.06 (14.85)	18.2 (15.96)	17.14 (15.38)	21 (21.18)



Fig 4.8 depicts the overall trend in elephant dung encounter rates from 2008 to March 2018 for the secured corridor lands as well as the corridor forests. There was an abrupt increase in the dung encounter rate in Valiya Emmadi in 2009, immediately after relocating the villagers. The elephants fed here on the crops in the field which had been left behind. There was also increased elephant movement through corridor lands and corridor forest during the dry season in 2010. This can be explained by low rainfall in the region; the wetlands and waterholes in the corridor could have attracted the elephants to the area. In 2016, this region was struck by severe drought, Wayanad being one of the worst hit districts. The presence of a waterhole in Puliyanolly attracted elephants in large numbers, which is reflected in the high dung encounter rate.

Since the spikes in dung encounter rate in 2009, 2010 and 2016 can be explained by isolated events, they are not representative of the overall functionality of the corridor and must be disregarded while assessing the long-term impact of relocation on facilitating elephant movement. The dung encounter rate in Kottapady village might also not be an accurate indicator for elephant movement through that area since high regeneration at that site might lead to low dung detectability.

Studies in Kalakad - Mundanthurai Tiger Reserve in the Western Ghats have shown an encounter rate of 2.01 dung piles/km in a landscape containing evergreen, dry deciduous and mixed deciduous vegetation patches (Varma, 2008). Similar studies in mixed deciduous scrub forest have recorded a dung encounter rate of 15.5 piles/km (Sukumar,

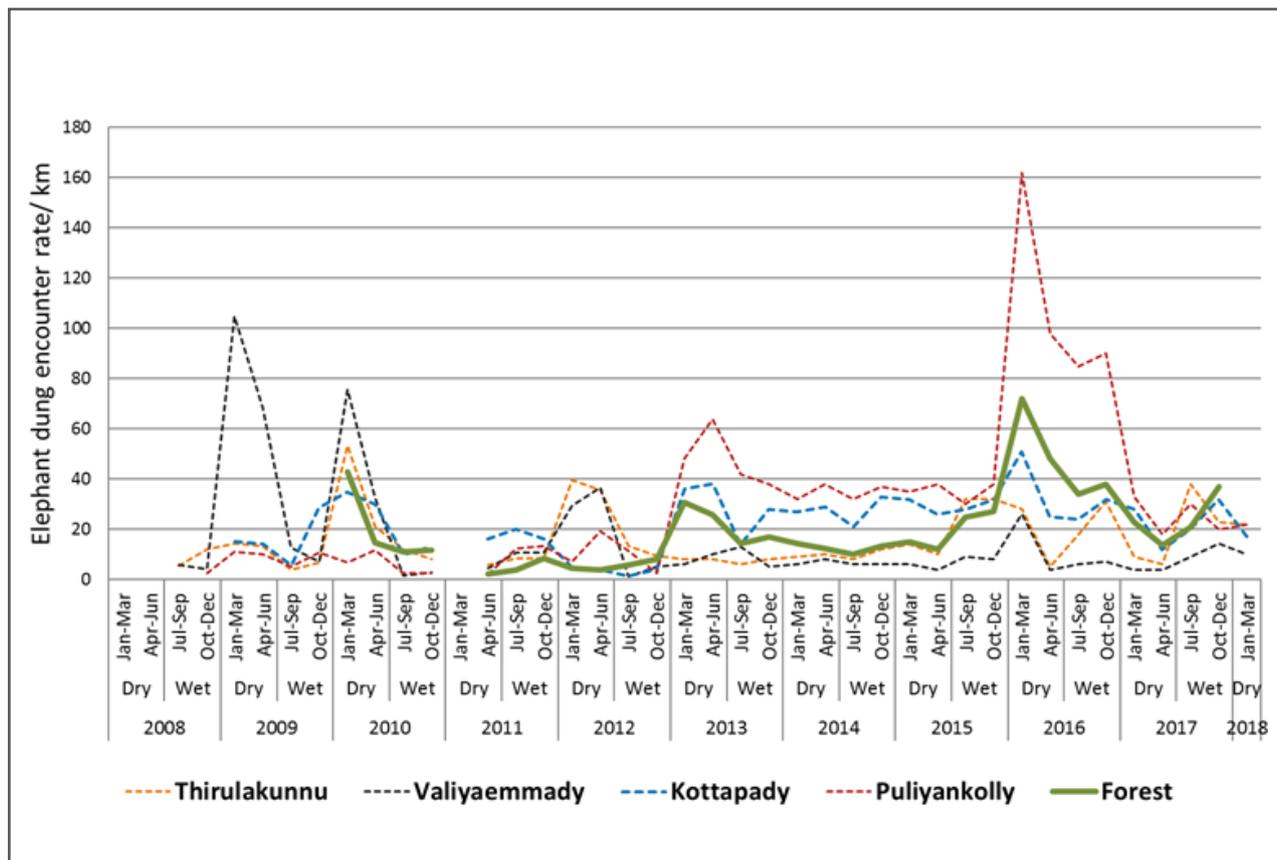


Figure 4.8: Elephant dung encounter rate in corridor lands and forests



1989). The higher observed encounter rate at the study sites could be because this is the only area available for movement, and might also have been inflated by events described above.

Analysis

The dung encounter rate across all sites was higher in the dry season (ANOVA (F (1,178) = 6.558, p <.05), specifically, dung encounter rate in the first dry season (January to March)

does not differ significantly between Valiya Emmadi (M=15.44), Thirulakunnu (M= 16) and Kottapady (M= 22.3). However, the observed mean dung encounter rate in Puliyaankolly (M=31.38) over the years was significantly higher than in Thirulakunnu and Valiya Emmadi. There was no significant difference between the overall dung encounter rate in all the corridor village sites (M=21.2) and the adjacent forest (M=20.01).

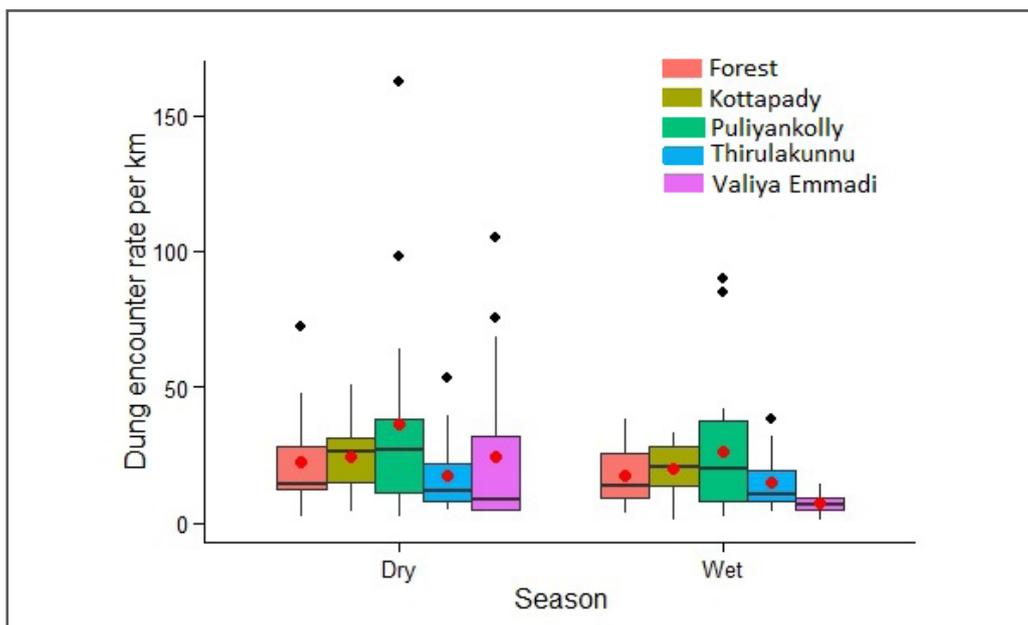


Figure 4.9: Boxplots showing distribution of dung encounter rate across different sites for the two seasons, dry (January to June) and wet (July to December). The line dividing the boxes represents the median, and the black dots represent outliers. The red dot represents the mean value.

(M=29.55) was significantly higher than in both the wet seasons (July to September and October to December) (M=16.06, 18.2) (Fig 4.9). This is because during the wet season, with water, fresh grasses and foliage available all around, the animals remain mostly within the forested area of the sanctuary.

An analysis of variance also showed that the effect of study location on dung encounter rate was significant (ANOVA (F (4,175) = 3.66, p <.01) (Fig 4.10). Post hoc analyses using Tukey's HSD (Honestly Significant Difference) test indicated that the mean dung encounter rate

A simple linear regression was done to predict how overall dung encounter rates in the corridor may have changed after the securement of corridor sites, but no significant relationship was found. However, results from analysis of variance show that the dung encounter rate at Puliyaankolly increased significantly after securement of the site, both with respect to other sites and with respect to itself before relocation. This can be attributed to easier access to food species and water at this site which would have attracted elephants especially during the years with lower rainfall.

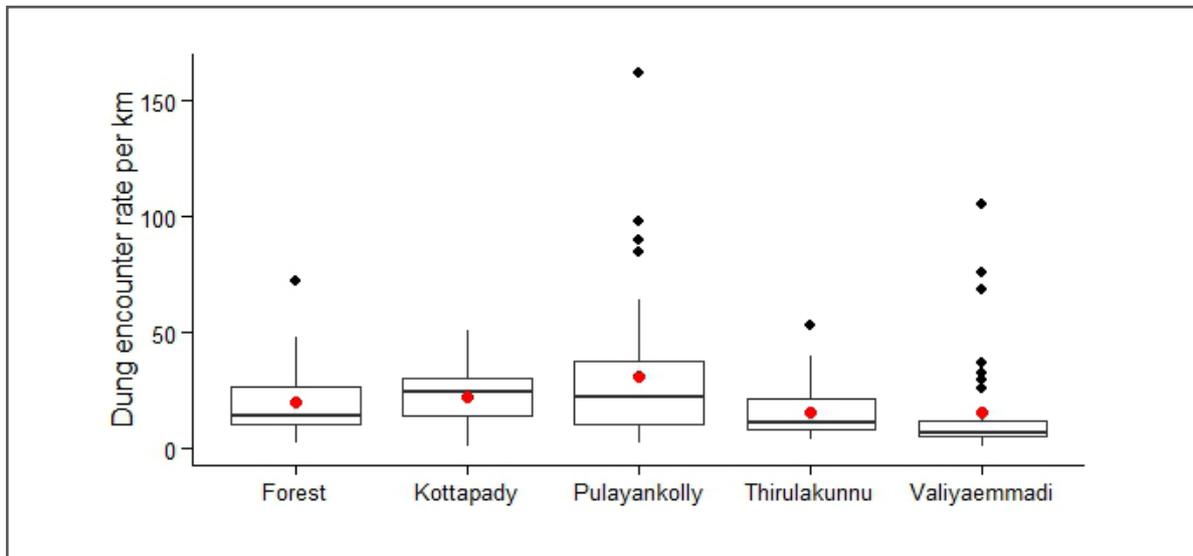


Figure 4.10: Boxplots showing distribution of dung encounter rate across different sites. The line dividing the boxes represents the median, and the black dots represent outliers. The red dot represents the mean value

The lower elephant presence at Thirulakunnu and Valiya Emmadi even after securement can be attributed to grazing pressure by local livestock. The lower encounter rate in Valiya Emmadi could also be because the secured corridor land has low tree regeneration and is still without much vegetation, hence the elephants are using the adjacent forest area for movement.

The functionality of the corridor is intact as the elephants are using it regularly throughout the year. However, long term monitoring of the corridor is key to making any conclusions about its functionality in increasing elephant movement post securement.

4.2.3.2 Tiger Presence in the Corridor

Camera trapping and direct sighting by WTI revealed the presence of at least three tigers in the secured areas (Fig 4.11-4.12). The tigers were photographed from Kottapady and Puliyankolly. The tiger photographed from

Kottapady was seen feeding on an Indian gaur. Intensive camera trapping by WWF in Wayanad Wildlife Sanctuary indicated the presence of around 75 tigers in the sanctuary, with around 26 individuals in Tholpetty range (Narasimen *et al.*, 2013).

4.2.3.3 Use of the Secured Areas in the Corridor by other Wildlife

A total of 19 mammals were reported (March 2013) from the secured area of the corridor (Annexure-II, Table 6). Apart from elephants, other species of ungulates and small and large carnivores were observed using the secured corridor land effectively. Major ungulate species recorded in the secured land were spotted deer, sambar deer and Indian gaur (Fig 4.13, 4.14). The number of pellets recorded in the transect survey of spotted deer was high (7/km) followed by gaur dung (3.3/km) and sambar pellet (1/km) which is very low (Fig 4.13). Two leopard pugmarks were recorded in Puliyankolly area.





Figure 4.11: Camera trap image of tiger in Puliyanakolly



Figure 4.12: Camera trap image of tiger at waterhole in Kottapady

Butterflies and birds were also studied in the secured corridor lands; 37 species of butterflies and 24 species of birds were recorded (Annexure II, Table 7,8).

4.3 Future Monitoring

WTI will continue to monitor the corridor with its designated local partner. They will collect information on animal movement, habitat quality and any potential threats to the corridor.

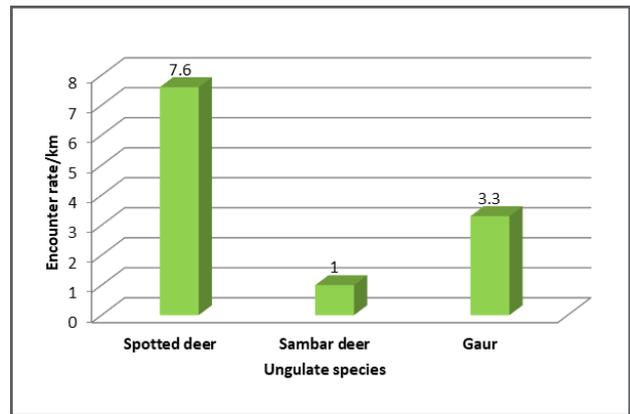


Figure 4.13: Pellets of ungulates encountered in the secured corridor land

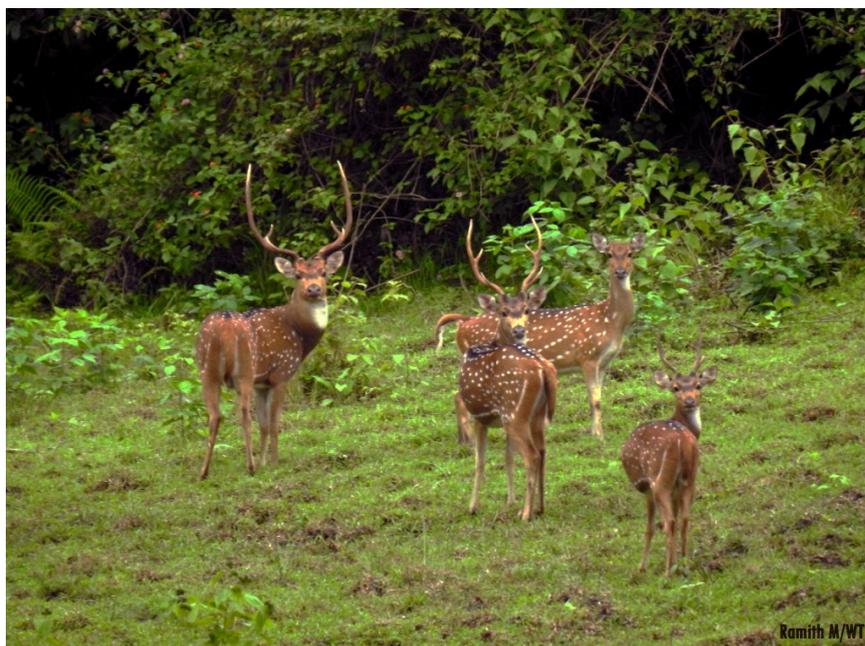


Figure 4.14 and 4.15: Spotted deer and gaur in the secured corridor areas



Corridor Monitoring Continued...

The ecological assessment and monitoring of corridor was undertaken between 2008 and 2018. WTI continues to further assess the anthropogenic pressure and wildlife usage of the corridor as part of its periodic monitoring protocol and here's a short note on the findings from the period January - March 2020.

The anthropogenic pressure and corridor usage by animals were assessed through 20x20 m sample plots at an interval of 50m along the transect in secured corridor lands and corridor forests. The length of the transects varied from 0.3 to 1 km. Opportunistic camera traps were also fixed to monitor corridor usage by wild animals.

The vehicular traffic intensity on the state highway between Thettu road and Thirunelli passing through the corridor were recorded round the clock (24 hours) on week days and weekend constituting a total of 2 sampling days. Vehicles were categorized into 4 types viz., two-wheeler, four-wheeler, six-wheeler and ten-wheeler & above.

Lopping and wood cutting in the corridor forest and secured corridor lands: Lopping signs were noticed in all the 41 tree species recorded in the corridor forest. Highest lopping signs were recorded for *Tectona grandis* (53.2 tree/ha) followed by *Cassia fistula* (26.4 tree/ha), *Dalbergia latifolia* (18.5 tree/ha) and *Senna spectabilis* (18.1 tree/ha). Relative percentage of lopped trees with respect to number of tree of the species recorded in the sampled area indicated high lopping of *Elaeocarpus* sp (100%), *Dalbergia latifolia* (97.6) and *Cassia fistula* (95%). Another 10 species represented by one individual each also showed 100% lopping. *Tectona grandis* and *Dalbergia latifolia* were the most preferred trees species for fuel wood by villagers as recorded during village survey.

In secured corridor lands, lopping was seen for 9 of the 36 tree species recorded. Highest lopping was recorded in *Elaeocarpus serratus* (18.8 tree/ha), followed by *Persea macrantha* (17.0 tree/ha) and *Syzygium cumini* (10.7 tree/ha). Relative percentage of lopped trees with respect to number of that tree species recorded in the sampled area indicated high lopping of *Lagerstromia microcarpa* (86%), *Coffea arabica* (83%), *S. cumini* (80%) and *E. serratus* (75%). Six other species represented by one individual each also showed 100% lopping. With villages and estates all along the 6km long corridor, the trees were lopped by people from the nearby forest and secured corridor land for cattle shed construction, building huts, fence around the house, fuel wood for personal and commercial use and this needs to be regulated.

A total of 14 tree species were affected due to wood cutting in corridor forest of which *Tectona grandis* was the most affected (33.8/ha) with mean basal girth of 70.2 cm. Remaining 13 species were very little impacted (less than 2/ha). In the secured corridor land, the wood cutting was lesser with only eight species impacted and density of wood cutting was less than 1.8/ha.

Overall, the lopping density of trees irrespective of species was higher (210.3 trees/ha) in corridor forest than secured corridor lands (107.7 trees/ha). Wood cutting density irrespective of tree species in corridor forest was notably higher as 43.9 tree/ha rather than secured corridor land (9.9 tree/ha) (Fig.1)

Cattle Grazing was seen only in the secured corridor land and not in the corridor forest with 56.2 dung piles/ha recorded during the survey largely in Valiya Emmadi and Thirulakunnu.

Traffic intensity: An average of 1165 vehicles were recorded plying per day on the state highway between Thettu road and Thirunelli with an average of 48.5 vehicle/hour. Average



Fig 1: Tree lopping density and wood cutting in corridor forest and secured corridor land

vehicular traffic was higher during day time between 6 AM and 6 PM with peak frequency of 124 vehicles/hour during 10-11 hrs. Between 6 PM and 6 AM, highest vehicular traffic was recorded between 18 and 19 hrs with 71 vehicles/hour and lowest was observed between 4 and 5 hrs (0.5 vehicles/ hr) (Fig. 2). Four wheelers were seen plying the most. Overall, the vehicular traffic was less throughout the late evening-early morning hours (7 PM-5 AM) and this is when the elephants mostly move through the corridor. Although not a major concern now but the traffic flow increases drastically during festivals at Thirunelli Temple.

Corridor usage: Indirect evidence of 11 species was reported in secured corridor land. Highest density was for spotted deer (96.4 pellet group/ ha) and elephant (93.8 dung piles/ha). Similar pattern was also noticed in corridor forest with high density of spotted deer (91.7 pellet group/

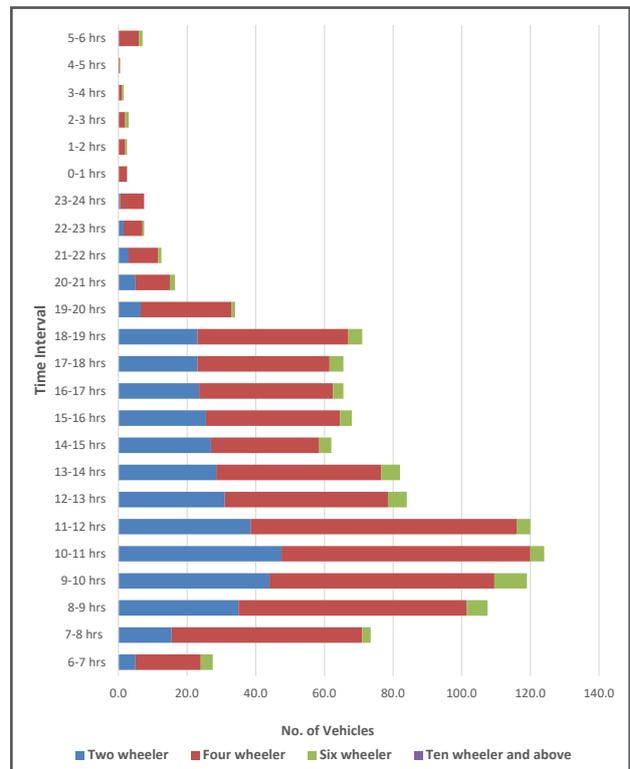


Fig 2: Highway vehicular traffic and frequency of different vehicle types passing through corridor area



ha) and elephant (66.2 dung piles/ha). It was interesting to see higher density of tiger scats in secured corridor land (5.4 scat/ha) than the corridor forest (3.2 scat/ha) (Fig. 3)

Camera trap pictures showed direct evidence of corridor usage by tiger (in Valiya emmadi), bonnet macaque, spotted deer, sambar deer, mouse deer, elephant, south-western langur, Indian grey mongoose, Ruddy mongoose, gaur, Indian hare, small Indian civet and wild pig.

A major concern in the secured corridor is the proposed National Highway from Kozhikode to Mysuru (alternate route due to night traffic ban in Bandipur) via Perambra – Thottilpalam – Mananthavady – Panavalli – Appapara – Kutta – Kanoor – Belale – Hunsur). This is being proposed as an alternative route due to the night traffic ban in Bandipur Tiger Reserve that will pass through the centre of the corridor in Panavalli- Appapara section. The proposed road and related activities along the highway will be a major hindrance to wildlife movement and defeat the very purpose of securing the corridor. Alternate route from outside the corridor should be explored for the highway.

Another major concern is the lopping of trees in secured corridor and corridor forest largely used for fuelwood. It is suggested to provide LPG connection to fringe villagers at a subsidised rate to minimise extraction.

Wildlife usage of the corridor indicated lower elephant presence at Thirulakunnu and Valiya Emmadi even after securement. This could be attributed to cattle grazing that was mainly seen in these two secured areas minimising the ground vegetation and regeneration of plants. This needs to be controlled and the fringe villages could be encouraged for stall feeding. Overall, direct and indirect evidence continue to indicate good usage of the corridor by elephants, tiger, gaur and other wild animals maintaining the functionality of the corridor. With better enforcement and regulation of anthropogenic pressure, the functionality of the corridor could be further improved and maintained. Wildlife Trust of India with our local partners will continue the periodic monitoring of the corridor.

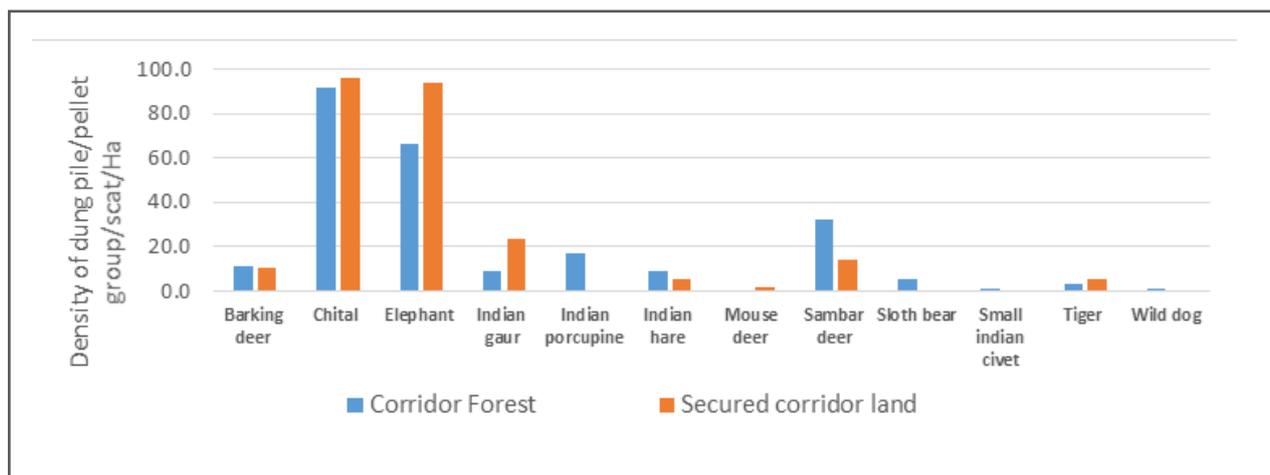


Fig 3: Indirect evidence of animal use in the secured corridor land and corridor forest

CHAPTER 5

MONITORING THE SOCIO-ECONOMIC STATUS OF RELOCATED FAMILIES

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Shajan MA and Tiju C. Thomas*

While it was clear that animals had started using the secured corridor, WTI still had to assess whether the second objective had been achieved: ensuring that villagers who contributed to the corridor conservation project were able to lead a better quality of life compared to their previous place of residence. Continuous post relocation engagement with the families was essential in order to facilitate a smooth transition into their new lives.

The families who voluntarily opted for relocation and contributed to securing the corridor land were supported by WTI with infrastructure, technical and financial support for a better quality of life outside the corridor area. The relocated sites are within a 5 km radius from where they were living previously, so as to minimise social and cultural problems that may arise as a result of shifting traditional homes. The corridor was secured by acquiring land owned by the villagers either by payment of the agreed value or by providing suitable alternate land and relocation packages. The voluntary relocation of the families to secure critical parcels of corridor land to provide unhindered elephant movement was successfully completed in 2011.

Since 2011, WTI has been continuously monitoring the communities to understand their socio-economic status before and after relocation, to understand the impact of relocation on their lives and to take corrective measures if need be, as well as to channel various government schemes to benefit the villagers. As a result of this regular interaction with local authorities and building local partnerships, of the families of those 11 married children earlier staying with their parents in Puliyanakolly, six went on to receive housing schemes making it a total of 32 families re-settled by 2018.



The relocation of villagers from a remote region to a more accessible location had a significant impact on those target families as they got better access to state services and market facilities. The project was unique in its scale as the relocation was entirely voluntary in nature and gave the relocated families the choice of determining the benefits they wanted to accrue from the relocation offer. The relocation package was designed in consultation with the beneficiary families and was transparent throughout the process.

The families were provided with land for housing in an area not far from the forest with the added benefit of facilities like schools, healthcare systems, transport links, and access to better livelihood opportunities. Each family was provided with an equal area of dry land for housing and wet land for agriculture activities, as well as a house with a toilet, common wells, access to a road, primary school, community hall, electricity and solar power fence at the relocation site. Care was taken to ensure that the agricultural land provided to the villagers had good irrigation facilities.

WTI conducted a post relocation survey of these 32 relocated families with the help of Ferns Naturalists Society, a local NGO and WTI's designated Green Corridor Champion (GCC)⁹ for the elephant corridor (Questionnaire in Annexure III). The survey was conducted for families who had voluntarily shifted from their former villages. Table 5.1 lists the villages that were relocated to new location as part of the relocation package.

The survey was conducted for the relocated villages of Kottapady, Valiya Emmadi, Puliyanolly and Thirulakunnu villages and indicators were developed to monitor the progress of relocation for the beneficiary families. A majority of families were Scheduled Tribals (81.25%) primarily belonging to the Oorali Kuruma (69%), Kattunayakan (12%) and with about 16% families from Other Backward Caste (OBC) and one family was Christian as indicated in Fig 5.1.

Indicators were developed and categorized as per specific socio-economic interventions initiated as part of the project and to measure the implementation and effectiveness of the corridor securement project. The aim was to

Table 5.1 – Details of Relocated villages

Relocated from	Relocated to	Number of Families
Thirulakunnu	Anappara	4
Valiya Emmadi	Panavally	6
Kottapady	Panavally	1
Puliyanolly	Chegady	21 (15+6)

⁹ An individual or community based organisation or institution that will motivate and mobilise local stakeholders by creating a sense of pride and ownership over the corridor; partnered with the Wildlife Trust of India (WTI) and Forest Department(s) to sensitise communities about the importance of elephant corridors; and use the support of local governments and other stakeholders to secure and monitor elephant corridors.

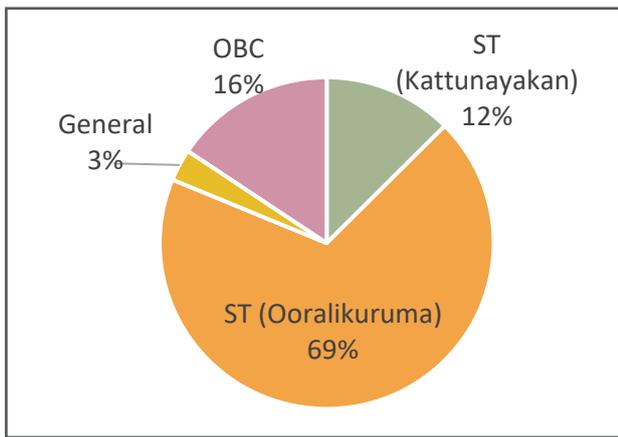


Figure 5.1: Caste categories of relocated population

collect data on eleven indicators and compare the findings pre and post relocation.

The indicators monitored were:

Indicator 1: Land ownership transfer

Indicator 2: Livelihood source & income

Indicator 3: Access to toilets and other infrastructure

Indicator 4: Education

Indicator 5: Energy

Indicator 6: Economic (income, expenditure, savings and possessions)

Indicator 7: Crop damage/ wildlife attacks

Indicator 8: Forest dependence

Indicator 9: Health and nutrition

Indicator 10 & 11: Attitudes (on forests, wildlife, corridor and relocation) and community engagement

Indicator 1: Land ownership transfer

Land Transfer - The voluntary move resulted from a mutually agreed relocation package. The package included providing land, tile-roofed

houses, wells and other facilities. The villagers were relocated from inside the corridor to areas outside the forest. Relocation sites were chosen within a 5 kilometre radius from where they were living before, so as to minimise the social and cultural problems usually associated with relocation programmes.

Land papers (*patta*) of the new households were transferred to the names of these families during registration and handed over at the house handover ceremony with the last set of people in 2011. Therefore, all relocated families became the legal owners of the land they now live on and farm as a result of the relocation package. This was the most significant and immediate impact of the project as the rights of all the families were addressed and *pattas* given to each family. Additionally, protection of the land holding from any illegal transaction in future, has been ensured by *The Kerala Restriction on Transfer by and Restoration of Lands to Scheduled Tribes Act, 1999*.

House Type - Prior to relocation, approximately 46.8% (n=15) houses were constructed under the IAY (Indira Aawas Yojna¹⁰) scheme and the rest were *kutch*a or sheet houses. Post-relocation, 87.5% (n=28) households were given concrete houses that had tiled roofs (Fig 5.4). The new houses were aesthetically designed with two bedrooms, a verandah, a kitchen, a prayer room and an attached bathroom. Fig 5.2 illustrates the design of the new house.

A small percentage of families from Puliyanolly (adult children of the families) were also given land at Chegady where they voluntarily relocated and built houses with their own resources. These were the adult sons of a few families who requested additional land at the relocation site so that they could build

¹⁰ Pradhan Mantri Gramin Awaas Yojana, previously Indira Awaas Yojana, is a social welfare flagship programme, created by the Indian Government, to provide housing for the rural poor in India.



their own houses. The project successfully provided concrete houses with tiled roofs for the relocated families thus contributing to addressing a major concern of housing for the community.

Pucca (concrete) houses were chosen because they provide better protection from extreme weather such as high winds and monsoon rains. The new houses were built using a mix

of cement and bricks and were designed in the traditional pattern prevalent in the district of Wayanad. The survey indicated that the relocated families had settled permanently in the new houses and were satisfied with the quality of construction.

Civil Society Integration - Post-relocation, all families were provided with ration cards¹¹, voter ID Cards¹² and Aadhaar Cards¹³, which

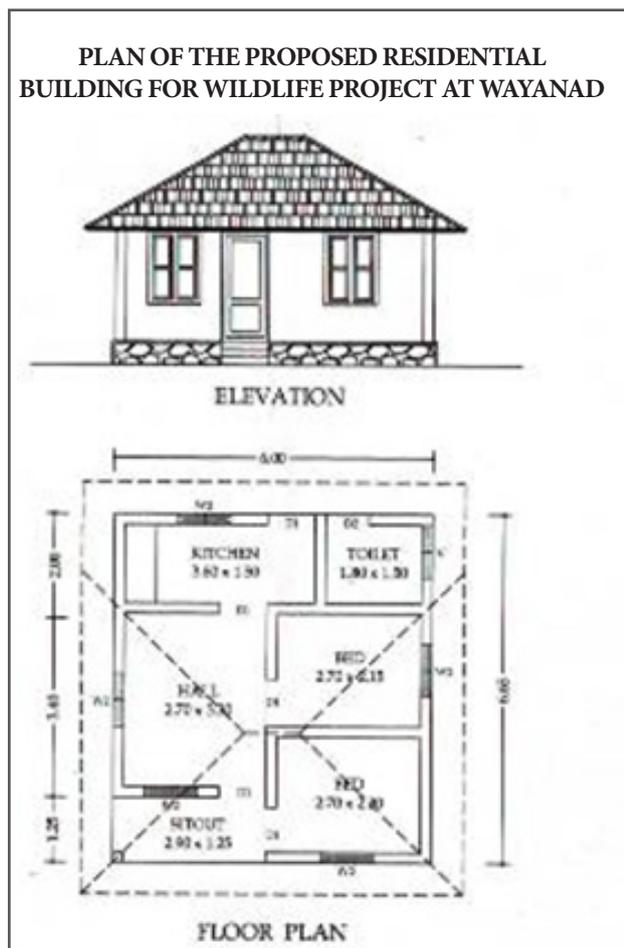


Figure 5.2: Plan of the proposed household at Wayanad



Figure 5.3: New house at Chegady village

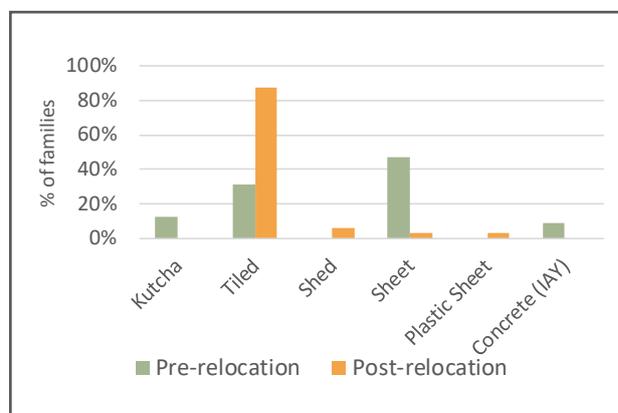


Figure 5.4: Types of roofs on houses, pre and post-relocation

¹¹ A ration card is an official document issued by state governments in India to households that are eligible to purchase subsidised food grain from the Public Distribution System (under the National Food Security Act). They also serve as a common form of identification for many Indians. Under the National Food Security Act, all state governments in India have to identify households that are eligible for purchasing subsidised food grain from the Public Distribution System and provide them with ration cards.

¹² The Indian voter ID card is an identity document issued by the Election Commission of India to adult domiciles of India who have reached the age of 18, which primarily serves as an identity proof for Indian citizens while casting their ballot in the country's municipal, state, and national elections. It also serves as general identity, address, and age proof for other purposes such as buying a mobile phone SIM card or applying for a passport.

¹³ Aadhaar is a 12-digit individual identification number issued by the Unique Identification Authority of India. Since it is unique for every individual, it serves as a proof of ID and residence, throughout the nation. Aadhaar is given to children and infants too, as there is no age limit to it. Aadhaar assures the uniqueness of every citizen of India on the basis of demographic as well as biometric information.



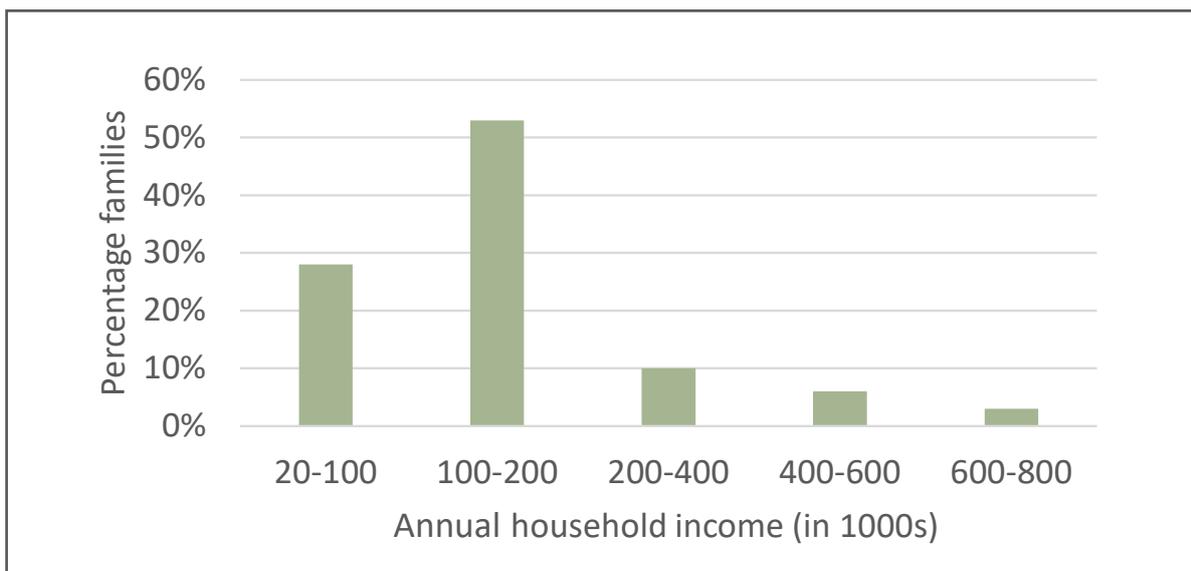
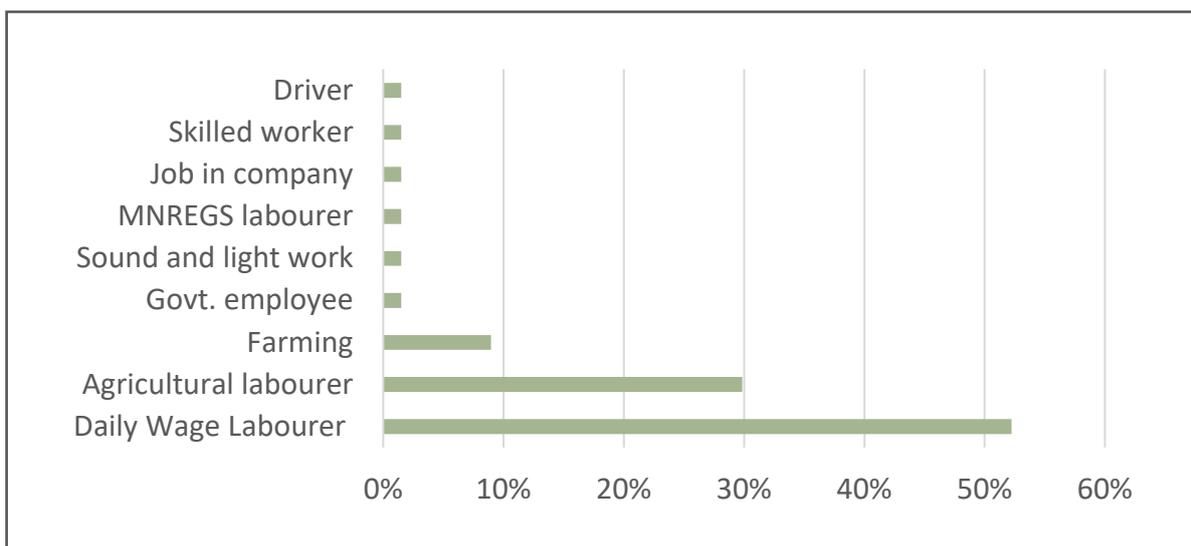
serve as indicators of permanent residency status, thereby helping them get assistance/benefits from Government social schemes that they could not access earlier. The project led to a greater integration of the beneficiaries with government schemes leading to more possibilities of convergence in the long term.

Indicator 2: Livelihood source & income

Annual household income of relocated families: The project aimed to raise the

economic status of the relocated families. Most families were involved in agriculture or daily wage labour as their primary source of income prior to relocation. Even the families which owned land were not able to generate enough income due to the fear of elephant depredation in the village. It was estimated that the yearly income averaged INR 41,040 per household (USD¹⁴ 631/per annum/family).

Post-relocation, 52% of the families continued working as labourers for their primary income, another 30% relied on farming while the remaining 18% were engaged in skilled labour



Figures 5.5 & 5.6: Primary occupation of working adults (top) and frequency distribution of household incomes, post-relocation (bottom)

¹⁴ 1 USD = 71.78 INR as of 15 November 2019



work as government employees under the Mahatma Gandhi National Rural Employment Guarantee Scheme, as company employees, drivers, or they were employed as electricians. (Fig 5.5)

The annual income improved considerably after relocation as a result of more wage labour opportunities for the relocated families. The average annual income increased to INR 175,080 per annum (USD 2,694/ per annum); with 25% (n=8) families earning INR 120,000 per annum (USD 1,846/annum), 18.8% families (n=6) around INR 60,000 per annum (USD 923) and 18.6% families (n=6) earning over INR 216,000 per annum (USD 3,323/annum) (Fig 5.6).

The highest percentage income of the relocated families came from daily wage labour¹⁵ (42%) followed by agricultural labour¹⁶ (26%) and farming on their own land (18%) (Fig. 5.7).

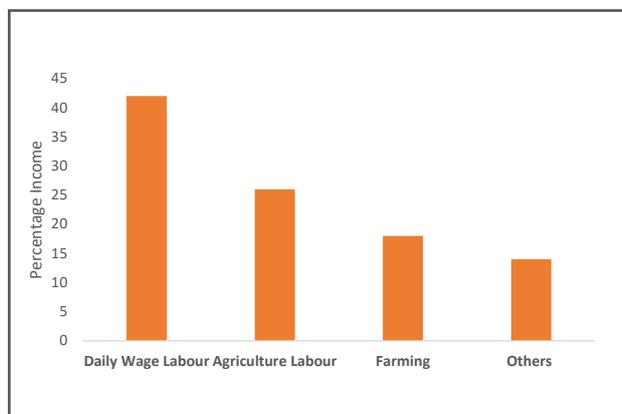


Figure 5.7: Percentage income from various sources, post-relocation

As the land allocated as part of the package was considerably closer to town and estates, the families had ample opportunity to work as labourers also in neighbouring agricultural land. This further increased their earning potential, which had not been possible before relocation while living inside the corridor forest.

The families were previously disadvantaged due to their location in a remote region but with greater access to transportation and better job opportunities, families were able to access more jobs and as a direct result, witnessed an increase of income.

The increase in earnings occurred as a result of: 1) increased yield of crops due to better irrigation facilities, 2) crop depredation by animals drastically minimised and 3) being closer to a town with other job opportunities.



Figure 5.8: Women from the relocated villages at work in their fields

¹⁵ Wage labour is the socioeconomic relationship between a worker and an employer, where the worker sells their labour power under a formal or informal employment contract. These transactions usually occur in a labour market where wages or salaries are market-determined.

¹⁶ A person who works on another person's land for wages in money or kind or share is regarded as an agricultural labourer. She or he has no risk in the cultivation, but merely works on another person's land for wages. An agricultural labourer has no right of lease or contract on land on which s/he works.

Indicator 3: Access to toilets and other infrastructure

Average distance to community infrastructures: The project assisted the villagers not only by providing new housing with toilet facilities but also by bringing the beneficiaries closer to various community infrastructures. Table 5.2 illustrates the infrastructures that were present at the new location.

The new location of the relocated villages was close to the main road as well as the *aanganvady* (child day-care centre). The lower primary school was within 1 kilometre of the new site. The nearest college was still 25 kilometres away but because the new village is closer to the road and public transport is frequent, the college is easier to reach. This is a remarkable change compared to their pre-relocation status where



Figure 5.9: Arts and Sports Club at Chegady Village

main roads and lower primary schools were much further from their homes.

Fig 5.10 indicates that the distance to the lower primary (LP) school reduced from 3 kilometres to less than a kilometre while the distance to

Table 5.2: Local infrastructures in the relocated village

S. no:	Institutions
1	Education Primary High School College
2	Hospital
3	Ration shop (PDS)- Public Distribution System
4	Gram Panchayat
5	Forest station
6	Police station
7	Post office
8	Club/other recreational facility
9	Bank
10	Shopping centre



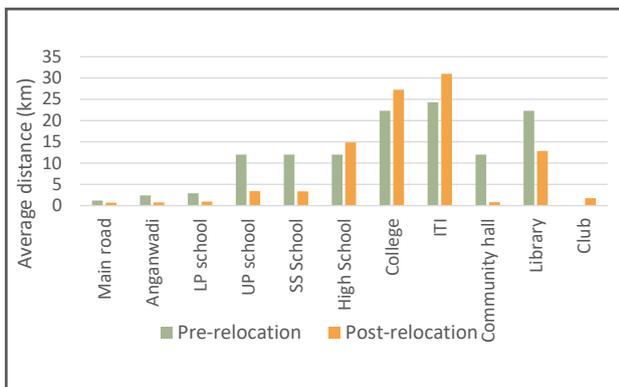


Figure 5.10: Average distance of community infrastructures

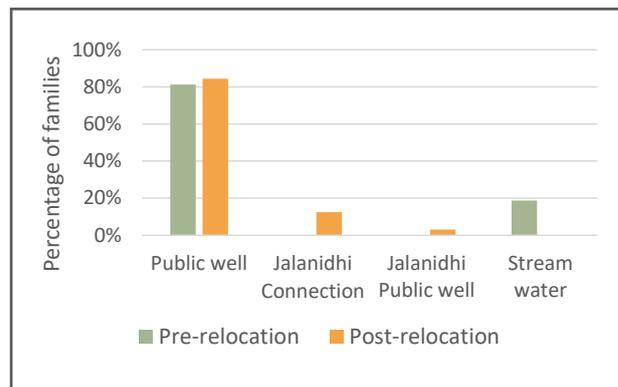


Figure 5.11: Water sources, pre- and post-relocation

the upper primary (UP) was reduced from 12 kilometres to 3 kilometres, providing an indirect incentive for lower primary students to continue studying till upper primary levels. Similarly, the distance to the nearest senior secondary school (SS) reduced from 12 kilometres to 2.5 kilometres, enabling students to complete their studies to senior secondary levels. The distance to the nearest college and Industrial Training Institute (ITI) marginally increased due to the shift in the villages nearer to the bus stand. However, the better availability of public transport helped reduce the travel time to the college and ITI.

The project also ensured that all the houses were provided with functional toilets and access to water, leading to better hygiene for the relocated families.

Source of water for the relocated families and its distance - A significant improvement for the families volunteering to relocate was the improved access to potable water in the new location (Fig 5.11). Previously, most families accessed potable water from a public well (81%) and the remaining accessed water from streams (19%). Post-relocation, the percentage of families accessing water from public wells increased to 87% (81% from public wells and 6% from *Jalanidhi*¹⁷ scheme wells) with the remaining 13% families receiving direct household connections for water. This marked reduction in the time and effort spent getting water greatly improved the overall quality of life of the relocated villagers as well as freeing up time to do other things.

¹⁷ **Jalanidhi** - It introduced some reforms in the rural water supply sector and is based on principles such as demand responsiveness, community ownership and sustainability of investments through cost recovery and participatory operations and management. The institutional architecture of Jalanidhi partners Gram Panchayaths, Beneficiary communities, Government of Kerala and NGOs are acting as supporting organisations. The Jalanidhi model of rural water supply schemes has successfully demonstrated an equitable, inclusive and decentralized delivery system benefiting the SC, ST and BPL category of rural households in Kerala.



Figure 5.12: Relocated families have much easier access to water from wells

Indicator 4: Education

Of the 143 family members from the 32 relocated families, 66% (n=94) had studied till high school. Discussions with the families revealed that the reason for this comparatively low level of education was the poor road connectivity to their houses before relocation. Also, the path from the main road to the settlement was intensively used by elephants and other wild animals. Additionally, most families sent their children for wage labour as a result of extreme poverty.

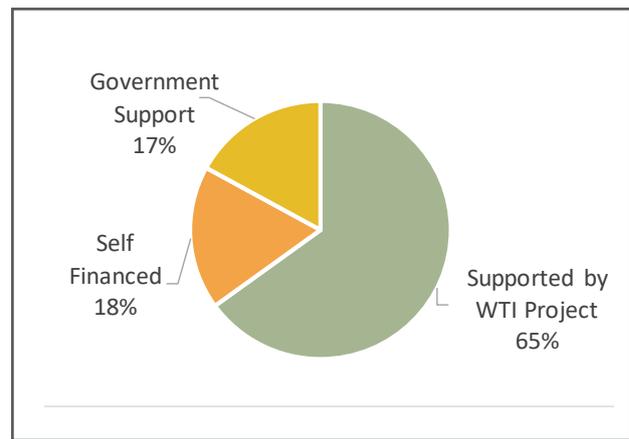
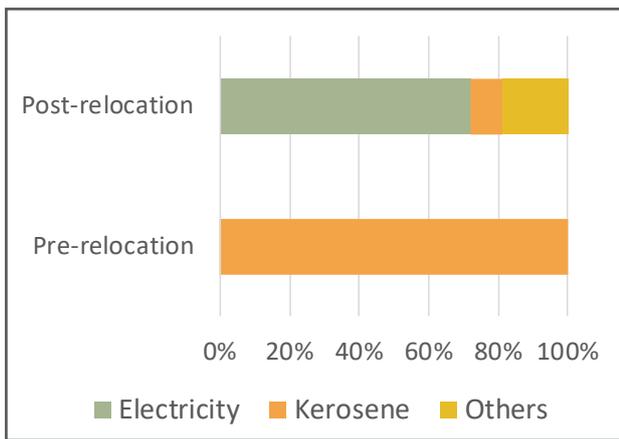
Post-relocation, the families were able to access more educational institutions. The percentage of illiterates (mostly children) had reduced from 33% (n=47) to 28% (n=40) post-relocation. Random checks suggested that 67% of children were now attending school and doing so regularly. There was a significant increase of students attending senior secondary and high school while a small number of students applied for professional courses as well. This indicates that villagers are taking advantage of the easier access to educational facilities now that their incomes have also improved.

Indicator 5: Energy

When the WTI survey team began its field work in the region, none of the households had an electric power connection. Instead there was an almost universal use of kerosene for lighting. The polluting effects of wick kerosene lamps are well known (Lam *et al.*, 2012) continuous use of this fuel contributes significantly to indoor air pollution and ill-health. Kerosene is also highly flammable and careless handling can cause accidental fires and burn injuries. The commonly used kerosene lamps are cheap but give poor light and the tank tends to heat up if used for long periods which can cause the stove to explode. It was therefore a priority to ensure that the relocated families should have access to electricity.

Energy for lighting – In order to encourage households to abstain from using kerosene, electric connections were promoted. 72% (n=23) of the relocated households were given electricity. Of these, 65% (n=15) got electricity as a result of a direct intervention by WTI (Fig. 5.13 and 5.14).





Figures: 5.13 & 5.14: Sources of lighting, pre-and post-relocation (left) and sources of support (right)

It proved difficult to wean the remaining families from their kerosene dependency as they were accustomed to using that particular source of energy. 9% (n=3) of the households continued using kerosene for lighting. The remaining 19% (n=6) used other sources for lighting such as lamps and firewood. The project team continued to explain the benefits of electricity to those families without it and all of them agreed to install new connections.

Energy for cooking - Prior to relocation, all the families relied on fuelwood for cooking. This dependency continued after relocation, however, extraction from only forests (61% families) reduced due to the distance involved in collecting fuelwood and the primary dependence shifted to a mix of collecting from forests and purchasing locally (Fig 5.15).

Also, 50% (n=16) of the families enrolled for an LPG (Liquefied Petroleum Gas) connection.

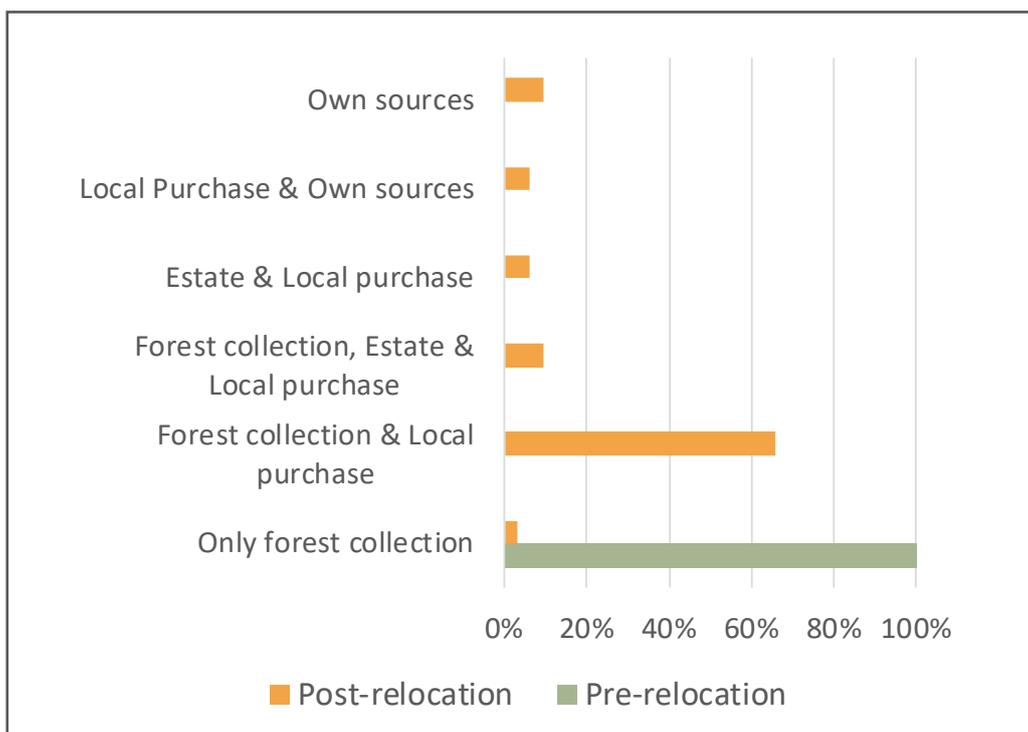


Figure 5.15: Sources of fuelwood for families, pre and post-relocation

LPG was mainly used during the rainy season or for emergency use. The monthly expenditure on LPG of these families averaged to INR 250/- per family. It is expected that with easy availability of LPG in future, there will be a gradual decline in the use of fuelwood which in turn will contribute towards decreasing the pressure on the surrounding forest landscape.

Fuelwood dependency: Pre-relocation all the households depended on forests for fuelwood. Post-relocation, 78% (n=25) of families still collected fuelwood from forests but in an increasing combination with local purchase and collecting from nearby coffee estates.

The growing dependence upon local purchase is exemplified by the increase in household expenditure for the procurement of fuelwood. 46% (n=13) of the relocated families purchasing fuelwood had a monthly expenditure of INR 250/- while 29% (n=8) spent INR 350/- per month (Fig 5.16).

The preferred tree species of fuelwood collected was teak (*Tectona grandis*) for 71% families (n=16) and rosewood (*Dalbergia latifolia*) for 11% families (n=3) (Fig 5.17). These two species, though fetching a high price for their timber value, were preferred for fuelwood due to their easy availability near the relocation sites. Cutting of these two species is not permitted so

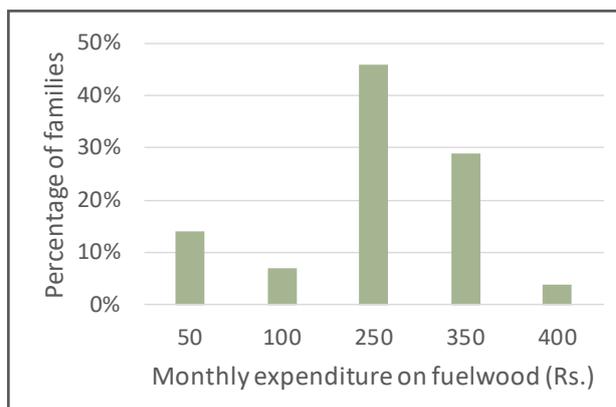


Figure 5.16: Monthly expenditure on fuelwood (INR), post-relocation

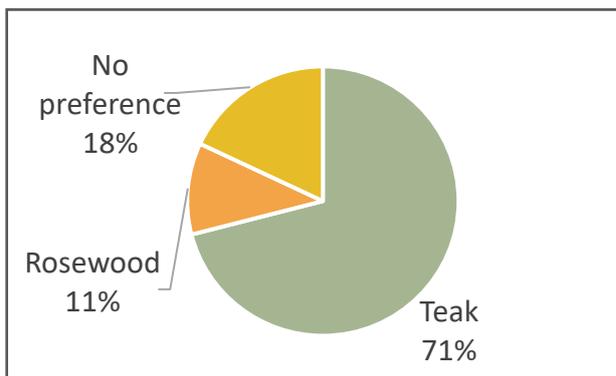


Figure 5.17: Preference of tree species for collection of fuelwood by relocated families

villagers prefer to forage for fallen branches for their fuelwood consumption.

The quantity of fuelwood collected and consumed annually by relocated families varied from 3,500 kg (64% families) to 2,500 kg (20% families) (Fig 5.18).

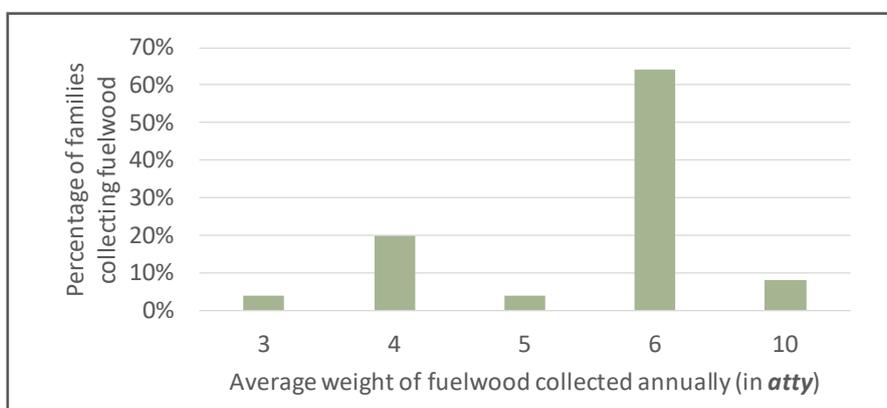


Figure 5.18: Average fuelwood collected annually (in atty)

1 Atty = 500-600 kg of firewood



Indicator 6: Economic (income, expenditure, savings and possessions)

It was observed that there was an increase in the purchasing power of the relocated families as well as access to round the clock electricity which provided alternative means of entertainment for the families in the form of television and radio. Access to these facilities in addition to LPG connections, mobile phones, motorcycles and even refrigerators in some cases has improved the lifestyle of the villagers, as compared to pre-relocation (Fig 5.19).

Cropping and land use pattern: Pre-relocation, farming was practiced by approximately 30% families as a secondary source of income and sustenance. Post-relocation over 70% of families were farming various crops (Fig 5.20), indicating that they found farming profitable on their new lands and saw it as a means of generating income. This was also because the agricultural land provided to the families had good irrigation facilities and was almost free from depredation by wild animals, increasing crop yield.

As illustrated in Fig 5.20, 53% (n=17) of families cultivated annual crops and 22% (n=7) of grew

seasonal crops, mainly vegetables. Annual and seasonal crops were supplemented by plantation of intercropping perennial crops such as coffee and pepper. Perennial crops were grown by 59% (n=19) of the relocated families. Additionally, in order to diversify the cropping pattern, farmers planted jack fruit and mango. Trees were raised by 41% (n=13) of the relocated families.

The relocated families had invested significantly to diversify their income generation and were aiming to become self-sufficient. Families cultivated banana (53% n=9) followed by ginger (42% n=7) and paddy (6% n=1).

Widespread annual cropping was mainly for sale and subsistence while seasonal cropping of vegetables was primarily for subsistence and was grown around the homestead or in small patches of cropland.

There was an increase in the acreage under annual crops, seasonal crops, perennial crops and plantations. 88% (n=15) of the families cultivated annual crops in less than an acre of land, with 12% (n=2) cultivating in one acre (Fig 5.21). In the case of tree plantations, tree grown by 63% (n=8) of the relocated families extends to two acres.

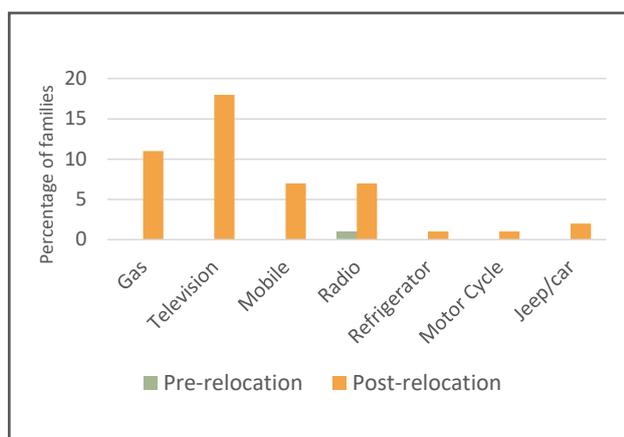


Figure 5.19: Items possessed by the relocated families

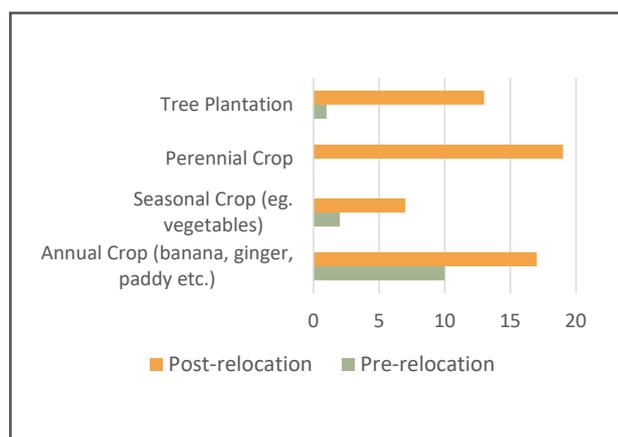


Figure 5.20: Cropping pattern percentage of the relocated families, pre and post-relocation



Expenditure for cultivation: The average amount spent on farming by the cultivating families was approx. Rs. 9,500/- as shown in Fig. 5.22. 33% of families (n=7) cultivated using seeds preserved at their house and their own labour. The maximum amount spent was Rs. 80,000 by 5% (n=1) of families.

57% (n=12) practiced traditional cultivation methods (Fig 5.23). With minimum intervention by agricultural extension officials, scientific and modern methods of cultivation have not yet been adopted on a large scale. 50% (n=11) of the farming families used bio-fertilisers while there was limited use of chemical fertilisers.

The crops planted by the relocated families were dependent upon the annual rains. Most families were able to tide over the dry season between February and May by having enough crops to

sustain themselves before the main cropping season during the monsoons.

Household expenditure: On average, households spent most of their earnings on food (36% of their income) followed by other consumables/groceries (21%), tobacco and alcohol (14%), healthcare (10%), education (4%) and others (15%) (Fig 5.24). On average, each month, 50% (n=16) of the relocated families spent Rs. 2,000 - 4,000 on food and 34% (n=11) of families spent INR 4,000 to Rs. 6,000 on food (Fig 5.25).

The relocated families believed in household remedies for healthcare, but some also opted for modern medicine. 47% (n=15) of families spent INR 500 on healthcare, while 19% of families (n=6) spent INR 1,000, 19% (n=6) spent INR 1,500 and 15% (n=5) spent INR 2,000-5,000 on healthcare and medical treatment (Fig 5.26).

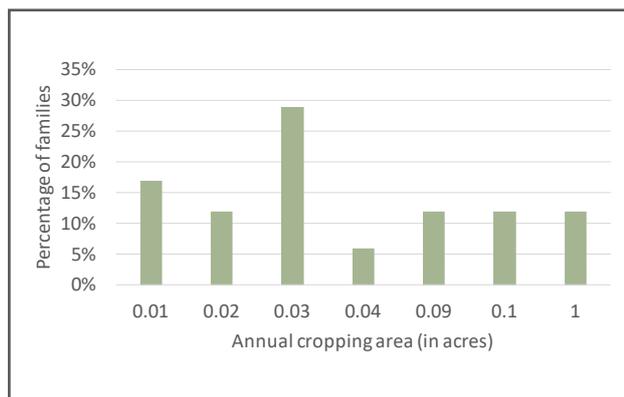


Figure 5.21: Annual and perennial crops cultivated

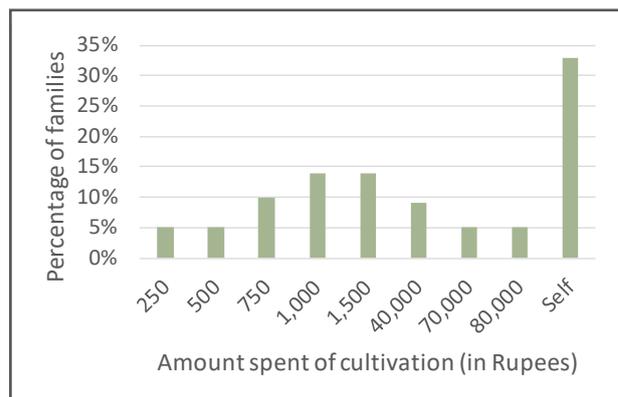


Figure 5.22: Amount spent on cultivation

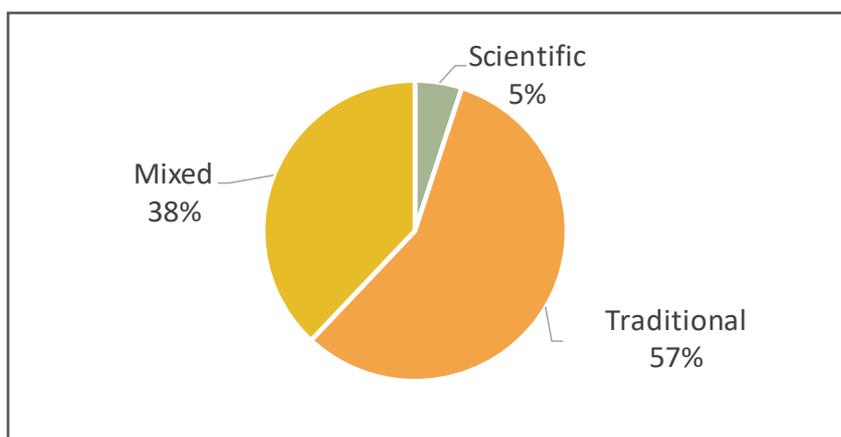


Figure 5.23: Various cultivation methods



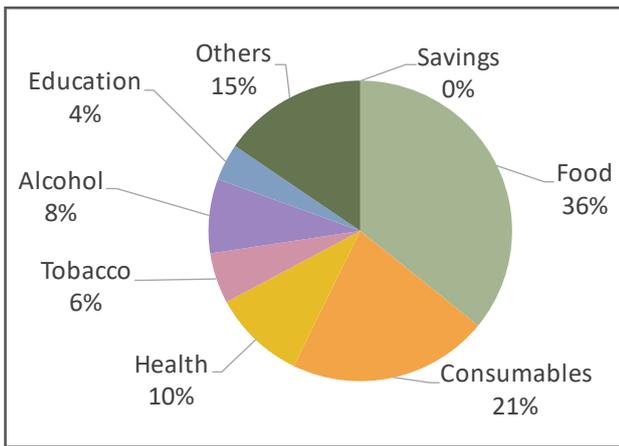


Figure 5.24: Relative percentage of household expenditures

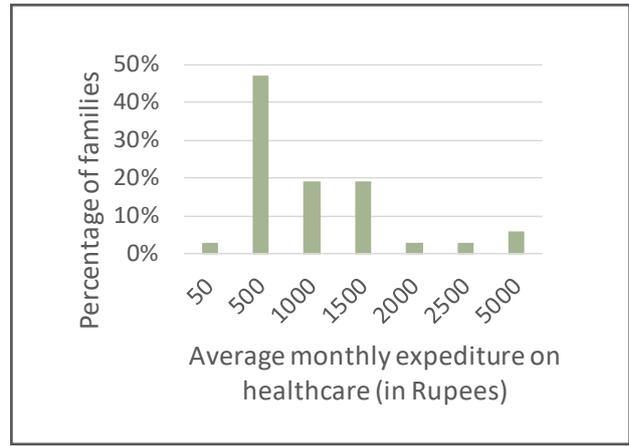


Figure 5.26: Expenditure on healthcare

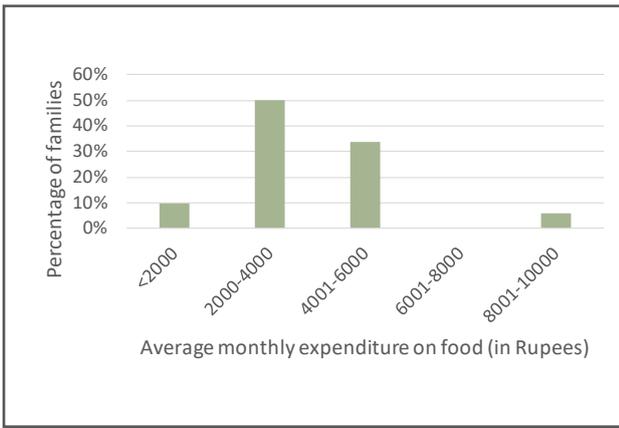


Figure 5.25: Average monthly expenditure on food

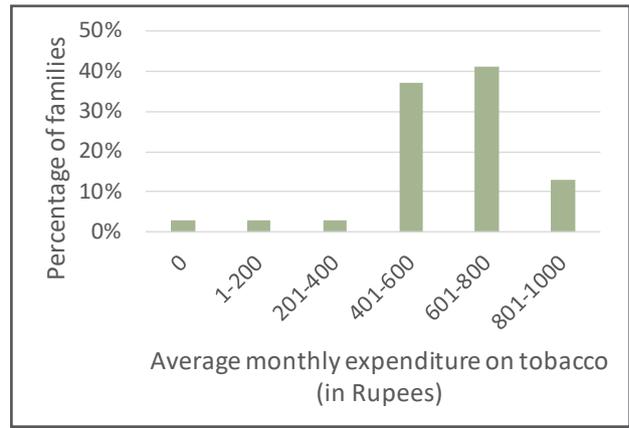


Fig 5.27: Expenditure on tobacco

Despite the increase in income, the relocated families had no savings because they are in the habit of spending money as soon as they earn it. Therefore there is a need for continued awareness on the benefits of savings and the importance of having a bank or post office account.

The expenditure on tobacco for the relocated families was INR 601-800 by 41% families (n=13) followed by INR 401-600/- by 37% families (n=12) which indicates a high dependency upon tobacco for these families (Fig 5.27) while alcohol dependency also shows a similar trend (Fig 5.28). Alcohol and tobacco addiction is a serious threat to the wellbeing of the community members and needs to be addressed by increasing awareness programmes

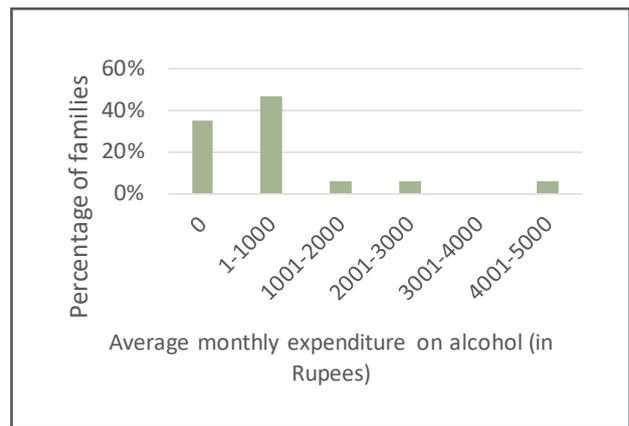


Figure 5.28: Expenditure on alcohol

for the relocated households. It is envisaged to introduce social reform programs in order to reduce dependency upon these toxicants through continued community mobilization activities by WTI.



Figure 5.29: Plantation destroyed by elephants

Indicator 7: Crop damage/ wildlife attacks

Human-wildlife conflict was a major problem when the families lived within the corridor. Most day to day activities were restricted as a result of the omnipresent threat of conflict. In fact, during the preliminary outreach period, this was a major concern shared by villagers at all the sites. Most families were busy with agricultural activities during the day and at night they had to guard crops from elephants and other wild animals. In spite of this constant vigil, a high proportion of their crop was lost due to elephants, wild boar, and other wildlife. This constant conflict not only took a financial toll but also a mental one on all family members from the stress of sleepless nights constantly guarding against depredation.

Post relocation, the scenario changed drastically; there were no attacks on the villagers or their property by wildlife, except for stray incidents of depredation by wild boar. Whenever electric fences were maintained properly, they provided protection for the crops and there was no damage. However, it

was necessary to continue maintaining the electric fence and as in many cases, the resettled villagers had not been doing so regularly.

Crop damage experienced by the relocated families: Personal interviews with the families revealed that almost all of them had experienced crop loss by wild animals before relocation. Elephants, deer, bonnet macaques and wild boar are primarily responsible for the crop raiding experienced by the households. Post-relocation, the incidences and intensity of crop loss has decreased. Table 5.3 illustrates the reduction in the number of families facing crop damage.

In a survey conducted in 2017, it was found that the crop damage by wildlife has reduced though not completely eliminated. Crop damage by elephants affected about 50% of the families followed by damage by bonnet macaques and wild boar. Post relocation, the families planted large areas with banana, coffee, pepper and ginger due to the prevailing high rates of return for these crops. Banana crops suffered the most damage (45%) followed by coffee (40%).

Table 5.3 – Families affected by crop damage pre and post relocation

Wild animals responsible for crop damage	Number of families affected prior to relocation	Number of families affected post relocation
Elephant	32	15
Deer	32	3
Bonnet Macaque	32	12
Wild Boar	32	8



Indicator 8: Forest dependence

Dependency of relocated families on forest for NTFPs : Collecting Non-Timber Forest Products (NTFPs) was a major activity for all families prior to relocation as all of them dependent on forests for NTFPs. Post-relocation, the dependency reduced, but 72% (n=23) of families were still dependent on forests for NTFPs. This continued as there was a dietary dependence and collection was mainly for edible leaves for consumption by 64% families, followed by mushrooms for 23% families and tubers for 13% families (Fig 5.30). NTFPs were mainly collected by male family members (87% families; n=20). Most of these products were collected within a kilometre of their houses.

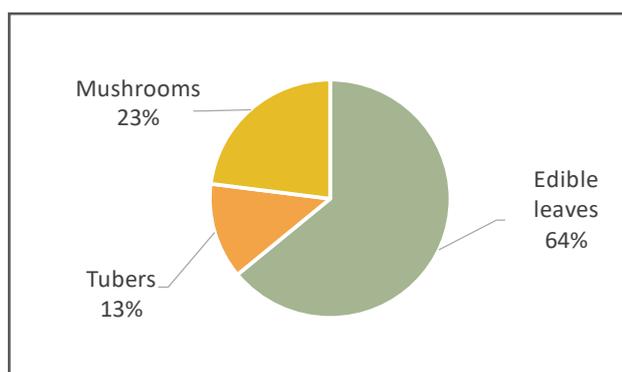


Figure 5.30: Relative percentage of NTFP collection by families, post-relocation

Indicator 9: Health and nutrition

Health status: Almost all the relocated families used modern medicine for relief and treatment. A key reason for this was proximity to the nearest health centre. For 78% of the relocated families, the distance to the nearest health centre was less than one kilometre and less than 3 kilometres for the remaining 22% of families. It was also found that the relocated persons were regularly vaccinated against diseases. Health camps organised by the government indicated fewer incidents of water borne diseases amongst the relocated families.

Dietary habit: The dietary habits of relocated families included cereals (consumed daily by 87.5% families), vegetables (consumed daily by 65% families) and pulses (consumed daily by 34% families). Eggs and meat were eaten occasionally by all the families (Fig 5.31). Cereals such as rice and ragi (finger millet) were sourced mainly by domestic production (87% families) & purchasing (9% families). Milk and eggs were purchased by over 90% of the families from nearby shops. 68% of the families sourced leafy NTFPs from the forests to supplement their diet.

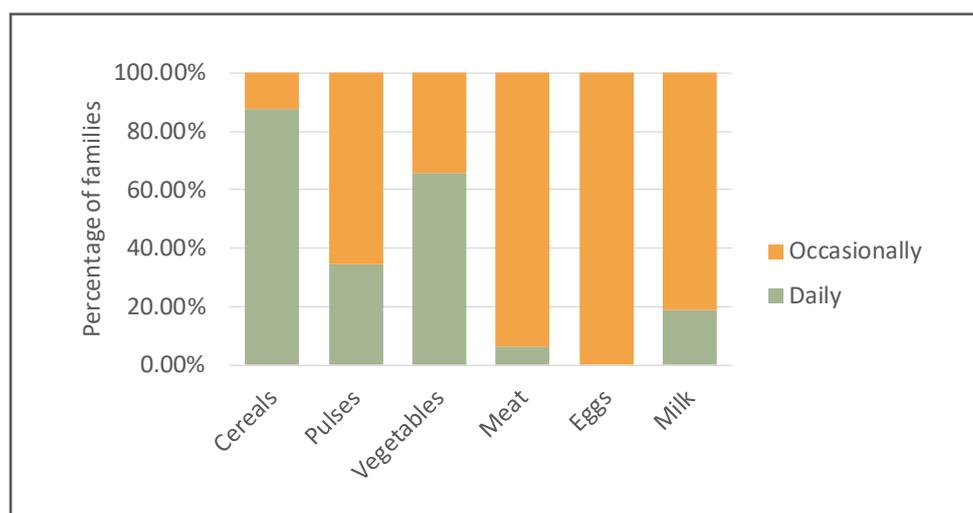


Figure 5.31: Dietary intake of relocated families

“This land is owned by Ganeshan (elephant) and I am comfortable living with wild animals. If the corridor stands for wild animals, only then I am ready to quit my place in Kottapady. Such places need to be conserved as reserve forest for wildlife in order to help them have free movement in the corridor”.

Lakshmi Avva

Indicator 10 & 11: Attitudes (on forests, wildlife, corridor and relocation) & community engagement

During the survey conducted in 2017, the relocated families were asked about their attitude towards forests, wildlife and the relocation process in a series of informal interviews and group discussions.

Prior to relocation, the issues of major concern were human-elephant conflict and limited access to education and healthcare. Although conflict was a concern, they did not have a negative attitude towards the crop raiding species nor towards the forest and, overall, were supportive of conservation efforts. The villagers had lived close to wildlife for generations and considered the forest as part of their lives yet had evinced an interest in moving from their current location as the increasing conflict had caused stress and decreased their quality of life.

Post relocation, the families indicated that they were pleased with the manner adopted to successfully implement the relocation package. The villagers saw their land turning into forest that ensured the safe passage of elephants and acknowledged the benefits to wildlife by moving away to new locations. Over 90% of the relocated families agreed that the new locations were largely free from wild animal encounters and attacks, had access to roads, schools, hospitals and so on. They were satisfied with having their own land, electricity with good demand for labour locally and in the neighbouring state of Karnataka as well. One of the main factors pointed out was that they could travel anytime of day or night to reach their house. There were misgivings from some individuals who desired a better relocation package and from others concerned about water scarcity in the dry season, but these concerns were assuaged with the promise they would be addressed in the future through the continued community monitoring programme by WTI and its local partner.

After relocation, the attitude of 12.5% of the community was very positive towards conservation and they showed a keen interest in safeguarding the forest. Approximately 85% were indifferent or not concerned about conservation while 2% had a negative attitude towards it.



CHAPTER 6

LEARNINGS AND FUTURE ROADMAP

Kunal Sharma and Upasana Ganguly

The Thirunelli - Kudrakote Elephant Corridor Project was a litmus test for the Wildlife Trust of India and its supporters (Elephant Family, IUCN NL and the World Land Trust) as the project aimed to provide a better quality of life for the local community while also providing safe passage to wildlife in the region. The project provided a roadmap in formulating a standard operating process (SOP) for similar securement projects elsewhere.

The process of relocation was based on the voluntary interest of the families to move from an area of high conflict to a safer location. The 32 relocated families have settled in their new locations with formal ownership of their land. With swampy grasslands (*vayals*) that people once cultivated now available to elephants for foraging, and people settled in areas with better access to other livelihood options, communications, healthcare, education and electricity, the assessment of their current socio-economic status is encouraging. The project ensured that there was an overall improvement in their economic situation and lifestyle as well as in their present and future prospects for better access to education/health support and even skills training for alternate incomes. One key impact of the relocation strategy was the ability of the relocated families to get access to safe road connectivity with the outside world. This had a cascading effect on school enrolment and access to easier healthcare for the families.

The secured corridor is being continuously monitored by WTI staff to record its use by elephants and other wildlife. Periodic monitoring has shown that following the relocation of villages, there has been a consistent corridor use by elephants. This is a clear case of a win-win outcome: the elephants have safe passage, as has been noted by the functionality assessment of the corridors, and people have better prospects and a future without fear of elephants. Moreover, the corridor land has been accorded legal protection as part of the Wayanad Wildlife Sanctuary and Wayanad North Forest Division thereby boosting the conservation efforts of the project.



Figure 6.1: Some community members of the corridor area

As with any land acquisition programme, the project also faced its share of challenges which have been transformed into valuable learnings for future corridor implementation work. The technical complexities surrounding land acquisition in today's context are tremendous. Property rights in Indian villages are not always clearly defined and may differ greatly from legal provisions internationally. In some cases, ownership details and even caste identity makes the process of acquisition difficult. With a densely populated country that puts a premium on valuable land, prices outside urban centers are also relatively high. In addition to these challenges, securing land is a politically sensitive issue as all stakeholders need to be on board and agree with the purchase and relocation process.

The project provided a roadmap to secure land for wildlife movement while also ensuring that the relocation of villagers was done with the utmost care. The project was a lesson in managing community perceptions and

addressing their concerns in a transparent manner. The team adopted a sensitive approach as any effort to secure land could be viewed with suspicion and the situation could become politically volatile. This often makes land purchase processes time-consuming.

The biggest and most time consuming challenge faced by the team was to convince villagers who had been living in the area for decades to relocate to a completely new place. Additionally, it was difficult to find details about rightful ownership of land as most families had elaborate family trees. Finally, agreeing upon a universal compensation package acceptable to all stakeholders was fraught with delays and conflict.

Thus, every aspect of the relocation policy was extensively discussed. The decision about type of alternative housing went through several processes of discussion and the final design and size was adopted after all stakeholders





Figure 6.2: A tusker crossing the highway that passes through the corridor

were convinced of its value. Another reason for an extended outreach programme during the initial stages was the perception amongst several villagers that the interests of animals were being placed above those of people. It was crucial to strike the right balance with such queries as the villagers had to be convinced that the relocation process was beneficial for them as well as for wildlife. In retrospect, the decision to engage locals to facilitate the entire relocation policy proved to be of immense benefit as it meant that the project implementation team, also comprising locals, could ensure a constant dialogue with the beneficiary villagers. Additionally, WTI's good relations with government departments at all levels proved crucial in furthering the success of the interventions.

For any successful conservation project, it is key to have an element of continuity and

sustainability in place. In 2017, after notification of the secured corridor land as Wayanad Wildlife Sanctuary and Wayanad North Forest Division, WTI collaborated with a community-based NGO, Ferns Naturalist Society, to continue monitoring the status of the relocated villagers. This continued engagement took the conservation initiative forward beyond the project period. Since then, the project has been sensitising, mobilising and motivating the community of relocated villagers as well as local school children and policymakers through various awareness workshops and activities. The aim is to build public support for corridor protection and encourage them to create a social momentum to protect the corridor in perpetuity. The collaboration also helped channel schemes/funds/ and other support from local governments for further development of the relocated villagers were the following:



Figure 6.3: Color TV sets becomes a household utility after electricity connections are provided

1. **Government schemes linked to the relocated villages** - Using this scheme, a tribal library was established in Chegady village under the supervision of the Library Council, electrification of two households and new housing by utilising government schemes for 4 families who had not received dwelling units earlier.
2. **Capacity building training** in bamboo products as an alternate livelihood was organised for the relocated families of Puliyanakolly through URAVU Indigenous Science and Technology Study Centre.
3. **Groundswell and conservation momentum for corridor conservation** built with approximately 500 children and locals through awareness and sensitisation activities using tools like photography exhibition, art competitions etc.
4. **Capacity building for forest watchers** who have been monitoring the secured corridor lands and corridor forests since 2016. They are collecting information regarding animal movement, habitat quality, and any potential threats to the corridor. To facilitate effective monitoring of corridors by the forest watchers, two forest watchers were provided with field kits comprising torch lights and backpacks.

The unique land securement project in South Asia has been heralded as an alternative strategy for a mutual coexistence between wildlife and people. The successful integration of the families is the key to developing upcoming securement projects. The learnings from this project have given the Wildlife Trust of India, government bodies and other civil society organisations with a benchmark guideline on securing elephant habitat and connectivity vis-a-vis community participation.





Figure 6.4: Training forest watchers in corridor monitoring



Figure 6.5: Group photo with local community members, school children and the WTI team



Figure 6.6: Awareness activities with children and local community members of the relocated villages



Figure 6.7: Skill building workshops on bamboo craft



Project at a Glance

Year	Status/Progress of Activities
2005	Project Initiated: a sociologist and a biologist are assigned. The sociologist starts working with villagers while the biologist starts mapping and monitoring elephant movement
2011	Secured four corridor plots by relocating people/providing agreed compensation for the land purchased
2011	Signage erected at major points in the corridor for the awareness of local people, development agencies and vehicle drivers
2015	Secured corridor lands handed over to Kerala Forest Department and notified as part of Reserve Forest/Wildlife Sanctuary by Government of Kerala (G.O.(P) No. 56/2015/F&WLD dated 5th August, 2015)
2008-16	WTI monitored the relocated families and corridor use by wild animals
2016	Achieved the proposed impact of the project: connectivity between prominent protected areas with Asian elephant populations strengthened through the securing of Thirunelli-Kudrakote corridor in Southern India.
2017 and will be continued	A local NGO (Ferns Naturalist Society) engaged to monitor the socio-economic status of the rehabilitated families and create awareness in corridor fringe areas as the Green Corridor Champions
2017 and will be continued	Two forest watchers from Wayanad Wildlife Sanctuary and Wayanad North Forest Department are trained and involved in monitoring the corridor use by wild animals. This activity will continue even after WTI leaves the project area. However, WTI has to keep in touch with the Forest Department to ensure the regular monitoring of the corridor.
2020	Project activities undertaken in the area are documented and compiled as the Wayanad Conservation Action Report (CAR) Monitoring of the corridor and relocated communities will continue by the Green Corridor Champions



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ANNEXURE - I

©

കേരള സർക്കാർ
Government of Kerala
2015



Regn. No. KERBIL/2012/45073
dated 5-9-2012 with RNI

Reg. No. KL/TV(N)/634/2015-17

കേരള ഗസറ്റ്
KERALA GAZETTE

അസാധാരണം
EXTRAORDINARY

ആധികാരികമായി പ്രസിദ്ധപ്പെടുത്തുന്നത്
PUBLISHED BY AUTHORITY

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GOVERNMENT OF KERALA
Forest and Wildlife (D) Department
NOTIFICATION

I

G. O. (P) No. 56/2015/F&WLD.

Dated, Thiruvananthapuram, 5th August, 2015
20th Karkadakam, 1190.

S. R. O. No. 507/2015.—WHEREAS, the Government of Kerala, in exercise of the powers conferred by Sections 27 and 76 of the Kerala Forest Act, 1961 (4 of 1962), had issued the Wayanad Wildlife Sanctuary Rules, 1973 vide Notification G. O. (Ms.) No. 182/73/AD dated 30th May, 1973 and published as S.R.O. No. 384/73 in the Kerala Gazette declaring an extent of 344.4 Sq. km. falling within the boundaries specified in the Schedule to be the said notification as “Wayanad Wildlife Sanctuary”;

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32/2181/2015/S. 21

AND WHEREAS, the Government of Kerala consider that the area, the situation and limits of which are specified in the Schedule below, is of adequate ecological, faunal, floral, geo-morphological, natural and zoological significance;

AND WHEREAS, it appears to the Government of Kerala that the said area is needed to be constituted as a Sanctuary for ensuring long-term protection of the entire biodiversity of the area, especially elephants, its corridor and habitat;

AND WHEREAS, the Wayanad Wildlife Sanctuary declared under sections 27 and 76 of the Kerala Forest Act, 1961 (4 of 1962) shall be deemed to be a sanctuary under the Wildlife (Protection) Act, 1972 (Central Act 53 of 1972) by virtue of sub-section (3) of section 66 of the said Act;

NOW, THEREFORE, in exercise of the powers conferred by Sub-section (1) of section 18 of the Wildlife (Protection) Act, 1972 (Central Act 53 of 1972), the Government of Kerala hereby declare their intention to constitute the said area as an extension to existing Wayanad Wildlife Sanctuary, to be known as "Wayanad Wildlife Sanctuary—Thirulakkunnu Addition Bit 1—Plot A and Plot B".

SCHEDULE

<i>District</i>	..	Wayanad
<i>Taluk</i>	..	Mananthavady
<i>Village</i>	..	Thirunelli
<i>Extent</i>	..	3.53 acres at Thirulakkunnu comprising portions of re-survey Nos. 401, 402 and 403.



SITUATION AND LIMITS

Thirulakkunnu Addition Bit 1—Plot A

Extent: 2.03 acres of land at Thirulakkunnu comprising portions of re-survey Nos. 401 and 402.

North.—The Northern boundary follows East, along the boundary of Kudrakote Reserve Forest (which is under the re-survey No. 400), from the GPS point N11.90257° E76.06112° to the GPS point N11.90238° E76.06136°.

East.—Thence the boundary runs Southward, along the boundary of Kudrakote Reserve Forest (which is under the re-survey No. 400) through the GPS points N11.90194° E76.06126°, N11.90186° E76.06169°, N11.90155° E76.06184° to the GPS point N11.90095° E76.06127°.

South.—Thence the boundary runs Westward along the boundary of EFL land (which is under the re-survey No. 402), through the GPS points N11.9010° E76.06125°, N11.90103° E76.06097° to the GPS point N11.90114° E76.06081°.

West.—Thence the boundary runs Northward along the boundary of EFL land (which is under the re-survey No. 401), through the GPS points N11.90175° E76.0611° and N11.90182° E76.06093° to end at the starting point of the Northern boundary, *i.e.*, the GPS point N11.90257° E76.06112°.

Thirulakkunnu Addition Bit 1—Plot B

Extent: 1.50 acres of land at Thirulakkunnu comprising portions of re-survey No. 403.

North.—The Northern boundary follows East, along the boundary of Kudrakote Reserve Forest (which is under the re-survey No. 400), from the GPS point N11.8994° E76.06095° to the GPS point N11.89952° E76.06144°.

East.—Thence the boundary runs Southward, along the boundary of Kudrakote Reserve Forest (which is under the re-survey No. 400) through the GPS point N11.89893° E76.06161° to the GPS point N11.89874° E76.06201°.



South.—Thence the boundary runs South-West along the boundary of Kudrakote Reserve Forest (which is under the re-survey No. 400 to the GPS point N11.89824° E76.06169° from where it runs North West along the boundary of EFL land (which is under the re-survey No. 403) to the GPS point N11.89864° E76.06139°.

West.—Thence the boundary runs Northward along the boundary of EFL land (which is under the re-survey No. 403) to end at the starting point of the Northern boundary, *i.e.*, the GPS point N11.8994° E76.06095°.

By order of the Governor,

P. MARA PANDIYAN,
Principal Secretary to Government.

Explanatory Note

(This does not form part of the notification, but is intended to indicate its general purport.)

Thirulakkunnu had been a settlement enclosed in the Thirulakkunnu Section of Tholpety Range, Wayanad Wildlife Sanctuary facing severe Human-Animal conflict, especially with elephants. The settlement lies in the Thirunelli-Kudrakote Elephant Corridor approved by Kerala Forest Department and Project Elephant of Ministry of Environments and Forests, Government of India. In 2006, on request from the inhabitants of the Thirulakkunnu settlement, Wildlife Trust of India, a Trust dedicated to nature conservation voluntarily rehabilitated the inhabitants after providing alternate land, house, water and other basic facilities. The Wildlife Trust of India showed its willingness to hand over the thus secured land to Kerala Forest Department to make it part of the Wayanad Wildlife Sanctuary. The reduced human pressure and disturbance in the erstwhile settlement resulted in safer passage of elephants and other animals through the corridor. Protecting the elephant corridor is important to maintain the gene-flow between habitats and to reduce human-wildlife conflict. For the protection of the entire bio-diversity of the area, especially the elephants, its corridor and habitat, the Government finds it important to declare the area as a Wildlife Sanctuary, as an extension to the existing Wayanad Wildlife Sanctuary.

The notification is intended to achieve the above object.



5

II

G. O. (P) No. 57/2015/F&WLD

Dated, Thiruvananthapuram, 5th August, 2015
20th Karkadakam, 1190.

S.R.O. No. 508/2015.—WHEREAS, the Government of Kerala, in exercise of the powers conferred by sections 27 and 76 of the Kerala Forest Act, 1961 (4 of 1962), had issued the Wayanad Wildlife Sanctuary Rules, 1973 vide Notification G. O. (Ms.) No. 182/73/AD dated 30th May, 1973 and published as S.R.O. No. 384/73 in the Kerala Gazette declaring an extent of 344.4 Sq. km. falling within the boundaries specified in the Schedule to the said notification as “Wayanad Wildlife Sanctuary”.

AND WHEREAS, the Government of Kerala, consider that the area, the situation and limits of which are specified in the schedule below, is of adequate ecological, faunal, floral, geo-morphological, natural and zoological significance;

AND WHEREAS, it appears to the Government of Kerala that the said area is needed to be constituted as a sanctuary for ensuring long term protection of the entire bio-diversity of the area, especially elephants, its corridor and habitat;

AND WHEREAS, the Wayanad Wildlife Sanctuary declared under sections 27 and 76 of the Kerala Forest Act, 1961 (4 of 1962) shall be deemed to be a sanctuary under the Wildlife (Protection) Act, 1972 (Central Act, 53 of 1972) by virtue of sub-section (3) of section 66 of the said Act.

NOW, THEREFORE, in exercise of the powers conferred by sub-section (1) of section 18 of the Wildlife (Protection) Act, 1972 (Central Act 53 of 1972), the Government of Kerala hereby declare their intention to constitute the said area as an extension to existing Wayanad Wildlife Sanctuary, to be known as “Wayanad Wildlife Sanctuary—Valiya Emmadi Addition Bit 2”.



6

SCHEDULE

<i>District</i>	..	Wayanad
<i>Taluk</i>	..	Mananthavady
<i>Village</i>	..	Thirunelli
<i>Extent</i>	..	6.1 acres of land at Valiya Emmadi Comprising portions of re-survey Nos. 410 and 411.

SITUATION AND LIMITS

North.—The Northern boundary runs Eastward, along the boundary of Kudrakote Reserve Forest (which is under the re-survey No. 400), starting from the GPS point N11.89212° E 76.04872° through the GPS points N11.89221 ° E 76.04893°, N11.89235° E76.04922°, N11.89296° E76.04931°, N11.89307° E76.04966°, N11.89307° E76.05008°, N11.89256° E76.05023° to the GPS point N11.89255° E76.05044°.

East.—Thence the boundary runs Southward along the boundary of Surplus land (which is under the re-survey No. 411) through the GPS points N11.8924° E76.05048° N11.89234° E76.05009°, N11.89226° E76.04993°, to the GPS point N11.89129° E76.04994°.

South.—Thence the boundary runs Westward along the boundary of Kudrakote Reserve Forest (which is under the re-survey No. 400), through the GPS points N11.89124° E76.04974°, N11.89119° E76.04915° to the GPS point N11.89114° E76.04898°.



West.—Thence the boundary runs Northward along the boundary of Kudrakote Reserve Forest (which is under the re-survey No. 400) to end at the starting point of the Northern boundary, *i.e.*, N11.89212° E76.04872°.

By order of the Governor,

P. MARA PANDIYAN,
Principal Secretary to Government.

Explanatory Note

(This does not form part of the notification, but is intended to indicate its general purport.)

Valiya Emmadi had been a settlement enclosed in the Thirulakkunnu Section of Tholpety Range, Wayanad Wildlife Sanctuary facing severe Human-Animal conflict, especially with elephants. The settlement lies in the Thirunelli-Kudrakote elephant corridor approved by Kerala Forest Department and Project Elephant of Ministry of Environment and Forests, Government of India. In 2008, on request from the inhabitants of the Valiya Emmadi settlement, Wildlife Trust of India, a Trust dedicated to nature conservation, voluntarily relocated the inhabitants by purchasing their land or by providing alternate land, house, water and other basic facilities. The Wildlife Trust of India showed its willingness to hand over the thus secured land to Kerala Forest Department to make it part of the Wayanad Wildlife Sanctuary. The reduced human pressure and disturbance in the erstwhile settlement resulted in safer passage of elephants and other animals through the corridor. Protecting the elephant corridor is important to maintain the gene-flow between habitats and to reduce Human-Wildlife conflict. For the protection of the entire bio-diversity of the area, especially the elephants, its corridor and habitat, the Government finds it important to declare the area as a Wildlife Sanctuary, as an extension to the existing Wayanad Wildlife Sanctuary.

This notification is intended to achieve the above object.



III

G.O. (P) No. 58/2015/F&WLD.

Dated, Thiruvananthapuram, 5th August, 2015
20th Karkadakam, 1190.

S.R.O. No. 509/2015.—WHEREAS, the Executive Director, Wildlife Trust of India, the owner of the land specified in the sub-joined Schedule below has represented in writing to the Principal Chief Conservator of Forests (Wildlife) their willingness for declaring the area as Reserved Forest and to be managed as part of the Wayanad Wildlife Division;

AND WHEREAS, the Government of Kerala finds it necessary that such land shall be managed by Divisional Forest Officer, North Wayanad on behalf of Wildlife Trust of India as a Reserved Forest.

NOW, THEREFORE, the Government of Kerala, in exercise of the powers conferred by sub-section (2) of section 36 of the Kerala Forest Act, 1961 (4 of 1962) do hereby declare that the provisions of the said Act shall apply to the land mentioned in the Schedule below:

SCHEDULE

<i>Name of the Reserve</i>	..	Thirunelli Extension
<i>Revenue Division</i>	..	Wayanad
<i>Taluk</i>	..	Mananthavady
<i>Village</i>	..	Thirunelli
<i>Extent</i>	..	8.37 acres of land at Kottappady

Situation: The block, Kottappady lies enclosed within the Thirunelli Reserved Forest and comprises portions of re-survey Nos. 395 and 396.



BOUNDARY DESCRIPTIONS

North.—The Northern boundary runs Eastward along the boundary of Thirunelli Reserve Forest (which is under the re-survey No. 399) starting from the GPS point N11.8956° E76.02824° through the GPS points N11.89545° E76.02867°, N11.89523° E76.02932°, N11.89501° E76.02947°, N11.89476° E76.02967°, N11.89459° E76.02962°, N11.89432° E76.02993°, N11.89462° E76.03006° to the GPS point N11.89488° E76.03111°.

East.—Thence the boundary runs Southward along the boundary of Thirunelli Reserve Forest (which is under the re-survey No. 399), through the GPS points N11.89467° E76.03106°, N11.8944° E76.03106°, N11.89415° E76.03092° to the GPS point N11.89394° E76.03081°.

South.—Thence the boundary runs Westward along the boundary of Thirunelli Reserve Forest (which is under the re-survey No. 399), through the GPS points N11.89403° E76.03008°, N11.89378° E76.02985°, N11.89357° E76.02944° to the GPS point N11.89362° E76.0291°.

West.—Thence the boundary runs Northward along the boundary of Thirunelli Reserve Forest (which is under the re-survey No. 399), through the GPS point N11.89411° E76.02868°, N11.89449° E76.02856°, N11.89469° E76.02849°, N11.89503° E76.02832° to end at the starting point of the Northern boundary, *i.e.* GPS point N11.89552° E76.02822°.

By order of the Governor,

P. MARA PANDIYAN,
Principal Secretary to Government.



Explanatory Note

(This does not form part of the notification, but is intended to indicate its general purport.)

Kottappady had been a settlement enclosed in the Thirunelli Reserved Forest in the Begur Range of Wayanad North Forest division facing severe Human-Animal conflict, especially with elephants. The settlement lies in the Thirunelli-Kudrakote elephant corridor approved by Kerala Forest Department and Project Elephant of Ministry of Environment and Forests, Government of India. In 2010, on the request from the inhabitants of the Kottappady settlement, Wildlife Trust of India, a Trust dedicated to nature conservation voluntarily relocated the inhabitants by purchasing their land or by providing alternate land, house, water and other basic facilities. The Wildlife Trust of India had requested the Kerala Forest Department to declare the thus secured area as Reserved Forest. The reduced human pressure and disturbance in the erstwhile settlement resulted in safer passage of elephants and other animals through the corridor. Protecting the elephant corridor is important to maintain the gene-flow between habitats and to reduce Human-Wildlife conflict. For the protection of the entire bio-diversity of the area, especially the elephants, its corridor and habitat, the Government finds it important to declare the area as a Reserved Forest.

The notification is intended to achieve the above object.



ANNEXURE - II

Table 1: Tree species recorded in corridor lands (elephant food species have been highlighted)

Sl. No.	Scientific name	Common name	Parts eaten
1	<i>Acrocarpus fraxinifolius</i>	Pink cedar, Indian ash	
2	<i>Ailanthus triphysa</i>	Maharukh	Leaf
3	<i>Albizia lebbek</i>	Indian walnut, lebbeck, lebbeck tree, flea tree, frywood	Bark, Leaf
4	<i>Albizia odoratissima</i>	Black siris/ Ceylon rosewood	Bark
5	<i>Anogeissus latifolia</i>	Axle wood tree	Bark
6	<i>Artocarpus heterophyllus</i>	Jack tree	Fruit, Seed
7	<i>Bambusa arundinacea</i>	Spiny bamboo	Young shoots
8	<i>Murraya koenigii</i>	Curry leaf tree	
9	<i>Bombax ceiba</i>	Silk cotton	Bark
10	<i>Buchanania axillaris</i>	Cuddapah almond	
11	<i>Butea monosperma</i>	Bastard teak, Flame of the forest	Bark
12	<i>Cassia fistula</i>	Golden shower tree	Bark
13	<i>Ceiba pentandra*</i>	Kapok tree, White silk cotton	Bark
14	<i>Cinnamomum verum</i>	True cinnamon tree	Bark
15	<i>Citrus aurantifolia</i>	Key lime	Fruits
16	<i>Coffea arabica</i>	Arabian coffee	Leaf, Twig
17	<i>Commiphora caudata</i>	Hill mango	Leaf
18	<i>Dalbergia latifolia</i>	Indian rosewood	Leaf, Bark
19	<i>Elaeocarpus recurvatus</i>	Nilgiri rudraksh	
20	<i>Erythrina variegata</i>	Indian coral tree	
21	<i>Melicope lunu-ankenda</i>	Melicope	



Sl. No.	Scientific name	Common name	Parts eaten
22	<i>Ficus racemosa</i>	Cluster fig tree	Leaf, Bark, Fruits
23	<i>Garcinia wightii</i>	Sour mangosteen	
24	<i>Gliricida sepium*</i>	Mexican lilac	
25	<i>Glycosmis arborea</i>	Ash sheora	
26	<i>Gmelina arborea</i>	White teak	Leaf, Twig
27	<i>Garcinia wightii</i>	Mysore gamboge/ Sour mangosteen	
28	<i>Grevillea robusta*</i>	Silver oak	Leaf, Bark
29	<i>Grewia tiliifolia</i>	Dhaman	Leaf, Twig
30	<i>Guava species</i>	Guava	Fruit
31	<i>Lagerstroemia lanceolata</i>	Nandi tree	Leaf
32	<i>Lepisanthes sp</i>		
33	<i>Mallotus tetracoccus</i>	Rusty Kamala	
34	<i>Mangifera indica</i>	Mango tree	Leaf, Fruit
35	<i>Melia azedarach</i>	Chinaberry tree	
36	<i>Magnolia champaca</i>	Champak	
37	<i>Neolitsea cassia</i>	Grey bollywood tree	
38	<i>Olea dioica</i>	Rose sandalwood	
39	<i>Phyllanthus emblica</i>	Indian gooseberry	Leaf, Fruit
40	<i>Pterocarpus marsupium</i>	Malabar kino	
41	<i>Schleichera oleosa</i>	Malay lac tree	Young leaves, Shoots
42	<i>Spondias pinnata</i>	Wild mango	Leaf, Fruit, Flowers
43	<i>Symplocus racemosa</i>	Lodh tree	Bark
44	<i>Syzygium cumini</i>	Black plum tree	Leaf, Fruit
45	<i>Tectona grandis</i>	Teak	Leaf, Bark
46	<i>Terminalia cuneata</i>	Arjun	Leaf
47	<i>Trema orientalis</i>	Indian charcoal tree	Leaf, Fruit



Table 2: Tree species recorded in Kottapady

Species	No. of individuals in all 5 quadrats	Quadrats of Occurrence	Relative Frequency	Abundance	Density
<i>Murraya koenigii</i>	1	1	20	1	0.2
<i>Melicope lunu-ankenda</i>	2	1	20	2	0.4
<i>Garcinia wightii</i>	1	1	20	1	0.2
<i>Mallotus tetracoccus</i>	2	2	40	1	0.4
<i>unid A</i>	2	2	40	1	0.4
<i>unid B</i>	1	1	20	1	0.2
<i>unid C</i>	1	1	20	1	0.2
<i>Melicope lunu-ankenda</i> <10cm	3	2	40	1.5	0.6
<i>Glycosmis arborea</i> <10cm	4	3	60	1.33	0.8
<i>Mallotus tetracoccus</i> <10cm	1	1	20	1	0.2
<i>unid B</i> <10cm	1	1	20	1	0.2
<i>Citrus aurantifolia</i> <10cm	2	1	20	2	0.4
<i>Coffea arabica</i>	1	1	20	1	0.2
<i>Coffea arabica</i> <10cm	42	2	40	21	8.4
<i>Cinnamomum verum</i>	2	2	40	1	0.4
<i>Dalbergia latifolia</i>	2	2	40	1	0.4
<i>Lagerstroemia lanceolata</i>	1	1	20	1	0.2
<i>Olea dioica</i>	1	1	20	1	0.2
<i>Phyllanthus emblica</i>	1	1	20	1	0.2
<i>Trema orientalis</i>	1	1	20	1	0.2
<i>Artocarpus heterophyllus</i> <10cm	1	1	20	1	0.2
<i>Cinnamomum verum</i> <10cm	15	4	80	3.75	3



Species	No. of individuals in all 5 quadrats	Quadrats of Occurrence	Relative Frequency	Abundance	Density
<i>Grewia tiliaefolia</i> <10cm	1	1	20	1	0.2
<i>Mangifera indica</i> <10cm	2	2	40	1	0.4
<i>Olea dioica</i> <10cm	9	4	80	2.25	1.8
<i>Schleichera oleosa</i> <10cm	1	1	20	1	0.2
<i>Syzygium cumini</i> <10cm	1	1	20	1	0.2
<i>Dalbergia latifolia</i> <10cm	1	1	20	1	0.2
<i>Ceiba pentandra</i> <10cm	2	1	20	2	0.4



Table 3: Tree species recorded in Thirulakunnu

Species	No. of individuals in all 5 quadrats	Quadrats of Occurrence	Relative Frequency	Abundance	Density
<i>Erythrina sp</i>	1	1	20	1	0.2
<i>Erythrina variegata</i>	4	1	20	1	0.8
<i>Citrus aurantifolia</i>	1	1	20	1	0.2
<i>Gliricida sepium</i>	4	1	20	1	0.8
<i>Glycosmis arborea</i> <10cm	12	2	40	6	2.4
<i>Coffea arabica</i>	22	3	60	7.33	4.4
<i>coffea arabica</i> <10cm	7	3	60	2.33	1.4
<i>Commiphora caudata</i>	1	1	20	1	0.2
<i>Dalbergia latifolia</i>	1	1	20	1	0.2
<i>Grevillea robusta</i>	8	2	40	4	1.6
<i>Mangifera indica</i>	1	1	20	1	0.2
<i>Tectona grandis</i>	1	1	20	1	0.2
<i>Terminalia cuneata</i>	1	1	20	1	0.2
<i>Olea dioica</i> <10cm	1	1	20	1	0.2
bamboo <10cm	1	1	20	1	0.2
<i>Cassia fistula</i> <10cm	1	1	20	1	0.2



Table 4: Tree species recorded in Puliyanakolly

Species	No. of individuals in all 5 quadrats	Quadrats of Occurrence	Relative Frequency	Abundance	Density
<i>Buchanania axillaris/ Persea macrantha</i>	1	1	20	1	0.2
<i>Elaeocarpus recurvatus</i>	1	1	20	1	0.2
<i>Erythrina variegata</i>	1	1	20	1	0.2
<i>Gliricida sepium</i>	11	2	40	5.5	2.2
<i>Lepisanthes sp</i>	1	1	20	1	0.2
<i>Mycaelia chembaka</i>	1	1	20	1	0.2
<i>Citrus aurantifolia</i>	1	1	20	1	0.2
<i>Neolitsea cassia</i>	1	1	20	1	0.2
<i>unid A</i>	1	1	20	1	0.2
<i>unid A <10cm</i>	1	1	20	1	0.2
<i>unid B <10cm</i>	1	1	20	1	0.2
<i>Vattami <10cm</i>	1	1	20	1	0.2
<i>Coffea arabica</i>	23	3	60	7.67	4.6
<i>Coffea arabica <10cm</i>	16	3	60	5.33	3.2
<i>Albizia odoratissima</i>	2	2	40	1	0.4
<i>Anogeissus latifolia</i>	1	1	20	1	0.2
<i>Commiphora caudata</i>	1	1	20	1	0.2
<i>Lagerstroemia lanceolata</i>	1	1	20	1	0.2
<i>Olea dioica</i>	1	1	20	1	0.2
<i>Syzygium cumini</i>	2	2	40	1	0.4
<i>Commiphora caudata <10cm</i>	1	1	20	1	0.2
<i>Gmelina arborea <10cm</i>	1	1	20	1	0.2
<i>Olea dioica <10cm</i>	3	2	40	1.5	0.6



Table 5: Tree species recorded in Valiya Emmadi

Species	No. of individuals in all 5 quadrats	Quadrats of Occurrence	Relative Frequency	Abundance	Density
<i>Erythrina variegata</i>	2	1	20	2	0.4
<i>Gliricida sepium</i>	6	2	40	3	1.2
<i>Melia azedarach</i>	1	1	20	1	0.2
<i>Citrus aurantifolia</i>	1	1	20	1	0.2
<i>Glycosmis arborea <10cm</i>	1	1	20	1	0.2
<i>Gmelina arborea</i>	1	1	20	1	0.2
<i>Olea dioica</i>	3	1	20	3	0.6
<i>Spondias pinnata</i>	1	1	20	1	0.2
<i>Symplocus racemosa</i>	2	1	20	2	0.4
<i>Ailanthus triphysa</i>	3	1	20	3	0.6
<i>Dalbergia latifolia</i>	1	1	20	1	0.2
<i>Ficus racemosa</i>	1	1	20	1	0.2
<i>Grevillea robusta</i>	2	2	40	1	0.4
<i>Mangifera indica</i>	4	2	40	2	0.8
<i>Dalbergia latifolia <10cm</i>	1	1	20	1	0.2
<i>Olea dioica <10cm</i>	2	2	40	1	0.4



Table 6: Checklist of mammals recorded in the secured area of the corridor

No.	Scientific name	Common name	WPA/IUCN 2011
Order: Artiodactyla; Family: Bovidae			
1	<i>Bos gaurus</i>	Gaur	Schedule I; VU
Order – Artiodactyla, Family – Cervidae			
2	<i>Muntiacus muntjak</i>	Barking deer	LC
3	<i>Moschiola meminna</i>	Mouse deer	Schedule I; LC
4	<i>Rusa unicolor</i>	Sambar	VU
Order – Artiodactyla, Family – Suidae			
5	<i>Sus scrofa</i>	Wild boar	LC
Order – Carnivora, Family – Felidae			
6	<i>Felis chaus</i>	Jungle cat	Schedule II; LC
7	<i>Panthera tigris</i>	Tiger	Schedule I; EN
8	<i>Prionailurus bengalensis</i>	Leopard cat	Schedule I; LC
Order – Carnivora, Family – Herpestidae			
9	<i>Herpestes edwardsii</i>	Grey mongoose	Schedule II; LC
Order - Carnivora, Family – Ursidae			
10	<i>Melursus ursinus</i>	Sloth bear	Schedule I; VU
Order – Carnivora, Family – Viverridae			
11	<i>Paradoxurus hermoproditus</i>	Common palm civet	Schedule II; LC
12	<i>Viverricula indica</i>	Small Indian civet	Schedule II; LC
Order – Lagomorpha, Family – Leporidae			
13	<i>Lepus nigricollis</i>	Black-naped, Indian hare	LC



No.	Scientific name	Common name	WPA/IUCN 2011
Order – Primates, Family – Cercopithecidae			
14	<i>Macaca radiata</i>	Bonnet macaque	Schedule II; LC
15	<i>Semnopithecus entellus</i>	Hanuman (Common) langur	Schedule II; LC
Order – Proboscidae, Family – Elephantidae			
16	<i>Elephas maximus</i>	Asian elephant	Schedule I: EN
Order – Rodentia, Family – Hystricidae			
17	<i>Hystrix indica</i>	Indian (Crested) porcupine	LC
Order – Rodentia, Family – Scuridae			
18	<i>Funambulus palmarum</i>	Three-striped palm squirrel	LC
19	<i>Ratufa indica</i>	Indian (Malabar) giant squirrel	Schedule II; LC

EN= Endangered; LC = Least Concern; NT= Near threatened; VU = Vulnerable; WPA= Wildlife (Protection) Act, 1972

Table 7: Butterflies recorded from the secured area of the corridor

S. No.	Common name	Scientific name
1	Angled castor	<i>Ariadne ariadne</i>
2	Blue mormon	<i>Papilio polymnestor</i>
3	Blue tiger	<i>Tirumala limniace</i>
4	Chestnut bob	<i>Lambrix salsala</i>
5	Chocolate pansy	<i>Junonia iphita</i>
6	Common bluebottle	<i>Graphium sarpedon</i>
7	Common bush brown	<i>Mycalesis perseus</i>
8	Common castor	<i>Ariadne merione</i>
9	Common cerulean	<i>Jamides celeno</i>
10	Common emigrant	<i>Catopsilia pomona</i>
11	Common five ring	<i>Ypthima baldus</i>
12	Common four ring	<i>Ypthima huebneri</i>
13	Common grass yellow	<i>Eurema hecabe</i>
14	Common Indian crow	<i>Euploea core</i>
15	Common jezebel	<i>Delias eucharis</i>
16	Common lascar	<i>Pantoporia hordonia</i>
17	Common leopard	<i>Phalanta phalantha</i>
18	Common mormon	<i>Papilio polytes</i>
19	Common pierrot	<i>Castalius rosimon</i>
20	Common sailer	<i>Neptis hylas</i>
21	Dark blue tiger	<i>Tirumala septentrionis</i>
22	Fulvous pied flat	<i>Pseudocoladenia dan</i>
23	Gladeye bushbrown	<i>Mycalesis patnia</i>
24	Glassy tiger	<i>Parantica aglea</i>
25	Grey pansy	<i>Junonia atlites</i>
26	Lemon pansy	<i>Junonia lemonias</i>
27	Lime butterfly	<i>Papilio demoleus</i>



S. No.	Common name	Scientific name
28	Nigger	<i>Orsotrioena medus</i>
29	Peacock pansy	<i>Junonia almana</i>
30	Plain tiger	<i>Danaus chrysippus</i>
31	Quaker	<i>Neopithecops zalmora</i>
32	Red helen	<i>Papilio helenus</i>
33	Red pierrot	<i>Talicaad nyseus</i>
34	Rustic	<i>Cupha erymanthis</i>
35	Striped tiger	<i>Danaus genutia</i>
36	Threespot grass yellow	<i>Eurema blanda</i>
37	Tiny grassblue	<i>Zizula hylax</i>



Table 8: Birds recorded from the secured area of the corridor

S. No.	Common name	Scientific name
1	Alpine swift	<i>Tachymarptis melba</i>
2	Black drongo	<i>Dicrurus macrocercus</i>
3	Brown headed barbet	<i>Megalaima zeylanica</i>
4	Chestnut- headed bee-eater	<i>Merops leschenaulti</i>
5	Common myna	<i>Acridotheres tristis</i>
6	Common snipe	<i>Gallinago gallinago</i>
7	Greater flame back	<i>Chrysocolaptes lucidus</i>
8	Green bee-eater	<i>Merops orientalis</i>
9	Grey junglefowl	<i>Gallus sonneratii</i>
10	Hill myna	<i>Gracula religiosa</i>
11	Indian grey hornbill	<i>Ocyrceros birostris</i>
12	Indian peafowl	<i>Pavo cristatus</i>
13	Jungle babbler	<i>Turdoides striata</i>
14	Lesser yellow nape	<i>Picus chlorolophus</i>
15	Malabar parakeet	<i>Psittacula columboides</i>
16	Pond heron	<i>Ardeola grayii</i>
17	Red wattled lapwing	<i>Vanellus indicus</i>
18	Red whiskered bulbul	<i>Pycnonotus jocosus</i>
19	Rose- ringed parakeet	<i>Psittacula krameri</i>
20	Ruddy-breasted crake	<i>Porzana fusca</i>
21	Spotted dove	<i>Stigmatopelia chinensis</i>
22	Tickell's blue flycatcher	<i>Cyornis tickelliae</i>
23	White- breasted waterhen	<i>Amaurornis phoenicurus</i>
24	White- throated kingfisher	<i>Halycon smyrnensis</i>



ANNEXURE - III

SOCIO-ECONOMIC SURVEY QUESTIONNAIRE

Name of the village/settlement:

Relocated from:

1. Name & address of head of the family :
2. Panchayath , Ward & House number :
3. Panchayath & Ward :
4. Taluk offices :
5. Religion of the respondent: Hindu Christian Muslim Other
 - a. Cast: General OBC SC ST Others
 - b. Whether tribe or non-tribe :
 - c. If tribe, name :

DEMOGRPHIC CHARACTERISTICS

7. Give demographic characteristics of household members

Sl no	Name	Sex	Age	Relation to Head	Education	Marital Status	Occupation	Disability	Income: monthly

Code:

- Sex: 1 (Male) 2 (Female)
- Education: 1 (LPS) 2 (UPS) 3 (HS) 4 (SSLC pass) 5 (HSC) 6 (Degree) 7 (Technical Education) 8 (Illiterate) 9 (others, specify)
- Marital status: 1 (married) 2 (unmarried)
- Occupation: 1 (Govt. employee) 2 (Cultivation) 3 (agriculture labourer) 4 (Forest labourer) 5 (NTFPcollection) 6 (others, specify)

Disability: 1(physical) 2 (mental)

8. Total Household Members : Male Female
9. Household Types : Nuclear Joint Extended Others
10. Household Annual Income (INR) :

HOUSEHOLD SUMMARY

11. House Type: Kuccha Pucca Tiled Concrete
(Plinth Area: Sq. Ft.)
12. Ration card: (1- Yes, 2 - No.)
1) How far is the PDS shop from present settlement? -
13. Availability of Water:
1) Distance to the water source: (Main water sources)
2) Sources of potable water: (1 - Own well, 2 - Pond, 3 - River,
4 - Public well, 5 - Neighbor, 6 - Pipe water, 7 - Canal, 8 - Others (specify))
3) Sources of irrigation: (1 - Own well, 2 - Pond, 3 - River,
4- Public well, 5 - Neighbor, 6 - Pipe water, 7 - Canal, 8 - Others (specify))
4) Period of water scarcity if any:
14. Type of toilet: (1- Nil, 2 - Cement 3 - Septic tank, 4 - Open pit, 5 - Others specify)
15. Energy for cooking: (1 - Firewood, 2 - Gas, 3 - Kerosene, 4 - Others (specify))
16. Energy for lighting: (1 - Electricity, 2 - Kerosene, 3 - Gobar gas, 4 - Solar energy, 5 - Others (specify))
17. Is your house electrified? : Yes No
1. Who supported for electrification: WTI own local govt others (specify)
18. Facilities in house:
1- Nil, 2 - Radio and bicycle, 3 - 2 and tape recorder and TV. 4- 3 and Fridge, 5- 4 and Telephone, 6 - 5 and Jeep / Car, 7 - Others (specify)

HOUSE HOLD EXPENDITURE AND LIABILITIES

19. Monthly Household Consumer Expenditures (INR)

Item	Amount	Item	Amount
Food		Consumables	
Health (medicine)		Tobacco	



Alcohol		Education	
Others			
Total		Total	

20. Savings: (1 -Yes, 2 - No)

21. Indebtedness:

Any loans: (1-Yes, 2- No)

If yes, give details:

Sl.No	Sources	Amount	Interest	Purpose	Specify Repaid or not

COMMUNITY INFRASTRUCTURE

22. Transportation facilities:

a. Mode of transportation: Public Private Other

b. Distance to the main road from the village/settlement:

23. Access to educational institutions: Aanganvady LP/UP/HS/HSS

College/ITI Other

a. Distance from the village/settlement:

24. What are the recreational facilities available in the village:

Community Hall Library Club Other (specify)

LAND USE AND CROPPING PATTERN

25. Homestead Farming -Cropping pattern

Sl.no	Crops (Annual, Seasonal, Perennial) / Trees sps.	Area under cultivation	% to total land	Yield	Purpose**
1					
2					
3					
4					
5					



6					
7					
8					
Total					

1) How do you meet the cost of cultivation: Self Govt. aid Loan

2) If through loan, from which source: Bank Private Money lenders others
(specify):

26. Cultivation Details:

1) Method of cultivation: Traditional Scientific Mixed

2) Fertilizer application: Bio- fertilizer (manure) Chemical fertilizer Mixed

3) Pesticides application: Bio – Pesticides Chemical Mixed

27. Source of Irrigation: River Well Rain Pumping Other

28. Irrigation available for second crop? Yes No

29. What are the major implements used for cultivation:

30. Crop damage details: Yes No

Sl. No.	Animal	Crop	Type of damage	No. of raids/ Month	Preventive measures

a. Probable reasons for wildlife attack:

FOREST DEPENDENCE AFTER RELOCATION:

31. If any forest dependences like NWFP? Yes No

If yes, what are the materials collecting from forest?

A. Food;

Sl. No	Item / part used	(Quantity / unit)	Season	Distance covered	Who collects



B. Fuel wood;

Sl. No.	Species collected	Reason for preference	Who collects	Quantity collected / Unit of Period			
				Season	Household use	Sale	Total

C. NTFP collection:

Sl. No.	Item	Quantity /day	Use*	Quantity Sold / Unit of period		Price / Unit	
				Society	Private	Society	Private

* Use - (1) Self use, (2) Sale, (3) Both.

D. Livestock / Poultry:

Livestock/Poultry	Number	Purpose	Fodder source
Cow			
Buffalo			
Goat			

E. Fodder Source

1) Fodder source: Stall fed Grazing Others

2) Grazing: Within the settlement forest area Both Others

32. Any technical/financial support from other agencies? Yes No

a. If yes, Type?: NGOs Govt: Subsidies Other

33. Whether any source of Renewable energy (Solar/biogas) is available in the household: _ _ _ _ _
_ _ _ _ _

34. Fuel consumption of the family:

Sl. No.	Type of Fuel	Source of procurement	Average daily consumption	Any seasonal preference	Expenditure on fuel (Daily / monthly etc.)



HEALTH DETAILS

35. Awareness about causation of illness: Yes No
36. Treatment type which following: Allopathic Ayurveda Ethnic Homeopathy
 Other
37. Access to health centre: Govt.(DH/HC/PHC/Sub Centre) Private Hospital Other
a. Distance from the village/settlement:
38. Nearest PHC/Hospital?
39. Immunization status of the children: Regular Rare Nil
40. Any addiction: Chewing Smoking Alcoholism Drug addiction
41. Any chronic illness in family? Yes No
If yes: Tuberculosis Sickle cell anemia Diabetes Asthma Leprosy
 AIDS Cancer Others

Nutrition

42. Dietary habits – Type of food intake Veg. Non Veg.
43. Daily inclusion of food stuffs – Cereals Pulses Vegetables Meat Fish Egg
 Milk
44. Source of food materials:
a. Cereals: Farming Purchasing
b. Eggs: Domestic Purchasing
c. Milk: Domestic Purchasing
d. Vegetables: Kitchen Garden From Forest Purchasing

ATTITUDE ON FOREST, WILDLIFE, CORRIDOR AND RELOCATION

45. Your opinion about the need of conserving the corridor and wildlife:
46. What are the steps to be taken by the forest department/NGOs in conserving the forest, wildlife and corridor according to you?
47. Comments about the relocation package of the WTI:
48. What are the positive and negative sides of present relocation?
49. What are the things WTI has to do other than the present package during relocation.



COMMUNITY ENGAGEMENT QUESTIONS

Q.No	Items	Pointers
1	Are you satisfied with the amount of contact you have with people in your community?	
2	Are you satisfied with opportunities to obtain information about your own locality?	
3	Are you satisfied with the help you get from your neighbours?	
4	Are you satisfied with the opportunities in your areas to obtain general information?	
5	Do you feel content about your relationship you have with your relatives?	
6	Do your relatives share your happiness?	
7	Do you think that you will get enough help from your neighbours in your family functions?	
8	Are you satisfied with the relationship you have with colleagues at your working place?	
9	Do you think that criminals are making daily life of people difficult in your community?	
10	Do you feel that people in your community should do more to control unlawful activities in your locality?	
11	Do you feel that you can easily get good medical care?	
12	Do you sometime feel disappointed that you cannot avail of the services/benefits which you feel are due to you?	
13	Are you satisfied with the transport facilities available in your area?	
14	Are you satisfied with the help you get from your family members?	
15	Do you think that your family members will sympathize with you in times of sorrow?	
16	Do you sometimes feel disappointed for not getting what is due to you because of caste or religious considerations?	
17	Are you often unhappy because of your family?	



18	Are you sometimes disappointed that friends are unwilling to help when you are in need?	
19	Do you feel that your neighbours will share your grief?	
20	Do you think that your colleagues at work will help you financially in times of need?	
21	Do your relatives share your grief?	
22	Do you think your friends will help you out in times of need?	
23	Could getting help from your colleagues at work cause problems in the future?	
24	Are you satisfied with the ease of access of medical facilities in your community?	
25	Do you think that sufficient efforts are being made by people of your community to maintain sanitation? (Disposal of sewage, and waste)	
26	Do you think that sufficient efforts are being made by people of your community to manage toilet facilities?	
27	Do you think that sufficient efforts are being made by people in your community to maintain the drainage facilities?	
28	Do you sometimes feel disappointed for not getting what is due to you because of corruption?	
29	Do you feel that criminals in your areas are too strong, and powerful?	
30	Are you satisfied with the relationship you have with your friends	

Response: Not really – 01, To some extent – 02, Very much - 03

Any Comments/remarks/observations of the Investigator: _____

Date of the survey: _____

Signature of the Field Investigator _____



A. OCCASIONAL REPORTS

Tribal Territories:

Impact assessment around the Jarawa tribal reserve, middle and south Andaman Islands

Jumbo Express:

A scientific approach to understanding and mitigating elephant mortality due to train accidents in Rajaji National Park.

Elephant in Exile:

A rapid assessment of the human-elephant conflict in Chhattisgarh

Against the Current:

Otters in the river Cauvery, Karnataka

Silent Stranglers:

Eradication of mimosa in Kaziranga National Park, Assam

Living at the Edge:

Rapid survey for the endangered Ladakh urial (*Ovis vignei vignei*) in Leh district of Ladakh Trans-Himalaya

Search for Spectacle:

A conservation survey of the Phayre's leaf monkey (*Trachypithecus phayrei*) in Assam and Mizoram

Awaiting Arribadda:

Protection of Olive Ridley turtles (*Lepidochelys olivacea*) and their nesting habitats at Rushikuliya rookery, Orissa

Living with Giants:

Understanding human-elephant conflict in Maharashtra and adjoining areas

Crane Capital:

Conservation strategy for Sarus Crane (*Grus antigone*) habitat in Etawah and Mainpuri Districts, Uttar Pradesh

Carnivore Conflict:

Support provided to leopards involved in conflict related cases in Maharashtra

India at the International Whaling Commission:

A policy document on India's involvement in the IWC 1981-2003

Sighting Storks:

Status and distribution of Greater adjutant storks (*Leptoptilos dubius*) in the Ganga and Kosi river floodplains near Bhagalpur, Bihar

Bait and Watch:

Popularization of alternatives to dolphin oil among fishermen for the conservation of the Ganges river dolphin (*Platanista gangetica*) in Bihar

Captive Concerns:

Health and management of captive elephants in Jaipur

Fair Concern:

Health and management of captive elephants in Sonpur

Ganesha to Bin Laden:

Human-elephant conflict in Sonitpur district of Assam

Healing Touch:

Health and Management of captive elephants in Kaziranga (2003, 2004, 2005)

Dog and Bull:

An investigation into carnivore-human conflict in and around Itanagar Wildlife Sactuary, Arunachal Pradesh

Making Way:

Securing the Chilla-Motichur corridor to protect elephants

No Mast Kalandar:

The Beginning to the End of Dancing with Bears

Deadly Tracks:

A scientific approach to understanding and mitigating elephant mortality due to train hits in Assam

Hunt for Hangul:

Establishing the presence of Hangul outside Dachigam NP, J&K

Civet Chronicles:

Malabar Civet Report

Bear Necessities:

A Scientific approach to understand and mitigate Human Sloth bear Conflict in Madhya Pradesh



B. CONSERVATION ACTION REPORTS

Beyond the Ban:

A census of Shahtoosh workers in Jammu & Kashmir

Biodiversity, Livelihoods and the Law:

The case of the 'Jogi Nath' snake charmers of India

Goats on the Border:

(First edition 2005 and Second edition 2007) A rapid assessment of the Pir Panjal markhor in Jammu & Kashmir distribution, status and threats

The Ground Beneath the Waves:

Post-tsunami impact assessment of wildlife and their habitats in India

Goats beyond the border: (Second edition)

A Rapid Assessment of the Pir Panjal 10 Markhor in J&K Distribution, Status and Threats

Walking the Bears:

Rehabilitation of Asiatic black bears in Arunachal Pradesh

Mountain Migrants:

Survey of Tibetan Antelope (*Pantholops Hodgsonii*) and Wild Yak (*Bos Grunniens*) in Ladakh, J&K

Predator Alert:

Attacks on humans by leopards and Asiatic black bear in the Kashmir valley – Analysis of case studies and spatial patterns of elevated conflict

Turning the Tide:

The campaign to save Vhali, the Whale Shark (*Rhincondon Typus*) in Gujarat

Tiger Country:

Helping Save Bhutan's Natural Heritage

Daring to Restore:

Coral Reef Recovery in Mithapur

The Last Dance:

Kalandar Alternative Livelihood Project/ Sloth Bear

Gujarat's Gentle Giants:

Conservation of Whale Shark in Gujarat

Living with the Wild:

Mitigating Conflicts between Humans and Big Cat species in Uttar Pradesh



C. CONSERVATION REFERENCE SERIES

Wildlife Law:

A ready reckoner - A guide to the Wildlife (Protection) Act 1972

Back to the Wild:

Studies in wildlife rehabilitation

Right of Passage: (1st edition)

Elephant corridors of India

Right of Passage: (2nd edition)

Elephant corridors of India

Commentaries on Wildlife Law: (Two publications, One printed in 2007 and One in 2008)

Cases, statutes & notifications

Poisons and the Pachyderm:

Responding to poisoning in Asian elephants – A field guide

Pakke Pachyderms:

Ecology and conservation of Asian elephants in Kameng elephant reserve, Arunachal Pradesh

Bringing Back Manas:

Conserving the forest and wildlife of the Bodoland Territorial Council

Canopies and Corridors:

Conserving the forest of Garo Hills with elephant and gibbon as flagships

Hasthisiksha:

A Manual on Humane Training of Elephant Calves Destined for Permanent Captivity (in English and Malayalam)

Crane Constituencies:

Important Sarus Wetland Sites in the Agricultural Landscape of Eastern Uttar Pradesh
Conflict to Co-existence



D. OTHERS

Tiger Bridge:

Nine days on a bend of the Nauranala, by Barbara Curtis Horton

Emergency Relief Network Digest 2005 – 2006:

Compendium of reports filed by the ERN Members

Emergency Relief Network Digest 2006 – 2007

Compendium of reports filed by the ERN Members

Action Tiger: (1st edition)

Tiger action plans of 12 tiger range countries

Action Tiger: (2nd edition)

Tiger action plans of 13 tiger range countries

Action Tiger: (3rd edition)

Tiger action plans of 13 tiger range countries

Live and Let Live (Tibetan Language):

Tibetan Environment handbook

Tigers of North Kheri:

21st International Bear Conference on Bear Research and Management – A Book of Abstract

21st International Bear Conference







CONSERVATION ACTION SERIES



Deep in the deciduous montane forests of the Western Ghats, the Thirunelli - Kudrakote (Brahmagiri-Thirunelli) elephant corridor is a 2,200 acre strip that connects the Brahmagiri Wildlife Sanctuary of Karnataka with Wayanad Wildlife Sanctuary of Kerala through the forests of the Wayanad Forest Division further leading to Nagarhole National Park and Bandipur National Park. This critical corridor is a lifeline for hundreds of Asian elephants and also provides a safe passage to a number of other species including tigers.

Sustained efforts across a decade enabled Wildlife Trust of India to secure this corridor in collaboration with the Kerala Forest Department and the local communities and with the support of Elephant Family, IUCN Netherlands and World Land Trust.

This report documents the approach of private land purchase and voluntary relocation of the inhabitants of four villages, that led to securing the right of passage for elephants and a safe future for people, thus creating a model for some corridor securements in future.

