PROJECT ELEPHANT

MANAGEMENT PLAN FOR ELEPHANT RESERVES IN KERALA

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PREFACE

The Elephant has been, from time immemorial, the symbol of strength, size and intelligence. It is closely associated with the culture of Indian people. This is especially true of Kerala. With about 600 animals in captivity, this largest terrestrial mammal has become an unavoidable necessity in all functions irrespective of caste and creed.

Due to its wide ranging habit and requirement of larger quantity of food and water, the elephant is the most affected species due to shrinkage and conversion of natural forests. On the other hand, demand for large home and feeding ranges necessitates the animal to raid neighbouring agricultural fielding habitations. The presence of a healthy population of elephants is an indication of a healthy environment. Hence, the elephant could be considered as a 'flagship' species.

It is worth mentioning that the Elephant Symposium organised by Kerala Forest Department in 1991 was one of the major forces in stimulating the formulation of project Elephant. Kerala Forest Research Institute was authorised for collection of field data and preparation of the Management Plan. This report is the outcome of extensive field work in the elephant ranges, literature survey and discussions with Forest Officials and Scientists and laymen concerned with the pachyderm at various levels.

April 30, 1994.

Dr. S. Chand Basha, I.F.S.
Director

FOREWORD

Project Elephant *is a conservation programme to save the largest, magnificent animal in the earth from extinction and there by contributing to the conservation of bio-diversity. The programme also reflects the concern of the public about the dwindling wildlife in the country.*

The Task Force appointed by the Government of India high lighted the conservation issues and broadly prioritised programmes requiring immediate attention.

The activities in the South is coordinated by a Regional Committee headed by the Chief Conservator of Forests (Wildlife) Karnataka. Preparation of a Management Plan for the Elephant Reserves was planned to identify and prioritise the conservation problems in the Reserves and suggest suitable recommendations.

Considering the suggestion of the Government of India to entrust the work with a competent independent agency, Kerala Forest Research Institute was entrusted with the work. The Institute has done a commendable work and the Management Plan, consisting of a text and the Appendix with maps, is a basic document regarding the Elephant Reserves in Kerala.

P.K. Surendranathan Asari, I.F.S.
Chief Conservator of Forests (Wildlife)

INTRODUCTION

Elephant has been considered by man as the embodiment of strength, intelligence and size since the dawn of recorded history. It has always been looked with mixed feelings of love, worship and fear. The Indian culture is so much associated with this animal that observations on elephants have been recorded even in ancient times. 'Hasthyayurveda', 'Mathangalila' and 'Sukraneethi' are still considered as important literature on elephant domestication, maintenance and their diseases.

The Asian Elephant once ranged over a vast area from the Tigris and Euphrates in West Asia to South East Asia (Olivier, 1978a). However, it disappeared from Iran, Afghanistan, Pakistan and Java. Asian Elephants are presently confined to Bangladesh, Bhutan, Burma, China, India, Indonesia, Kampuchea, Laos, Malaysia, Nepal, Sri Lanka, Thailand and Vietnam.

Elephant was once distributed all over India (Jerdon, 1874; Ali, 1927; Olivier, 1978b). However, it is presently confined only to certain areas and exist as five disjointed populations (Daniel, 1980). Those populations are distributed in North Western, Eastern, Central and Southern India. They are discontinuously distributed and occupies the fragmented habitats. Habitat fragmentation due to developmental programmes and encroachments, degradation of the habitat due to monoculture plantation, fire, weeds and othe biotic interferences, poaching for ivory - all contributed to the sufferings of the species in the natural habitat. One of the key species reflecting the health of the habitat, management of elephant will ultimately lead to conservation of the ecosystem as a whole thereby contributing to the welfare of all the species in the diverse system.

ELEPHANTS IN KERALA

Elephant is revered by all sections of people in Kerala. Elephant is an integral part of all festivals irrespective of caste and creed. It has been tamed from time

immemorial and used for festivals, timber logging and even in the fight between kingdoms. The elephant habitat, once contiguous and rich, became fragmented due to various reasons such as developmental programmes, conversion for Agriculture and cash crops, etc. These fragmented habitats are further disturbed by biotic interference such as settlements, fire and over-exploitation of forest produces. Lack of food and moisture coupled with the shrinkage of habitat and disturbance from within and outside the areas, the elephants are forced to enter the innumerable settlements scattered all over leading to man-elephant conflict often deterimental to the species itself.

Distribution of Elephants in Kerala

Easa(1989) has discussed the distribution of elephants in Kerala. However, on the basis of recent information on contiguity of forests, the elephants in Kerala part of the Western Ghats could be considered to exist as ten populations. But the contiguity is maintained in some parts through narrow strip of forests in Tamil Nadu. Further, a few of these populations maintain contact and exchange of genes ensured through seasonal movements of tuskers between areas separated by human settlements. These movements are often at the risk of life of elephants.

1. The Brahmagiri Population

This population occupies the areas between north of Kabani river and extends upto Kottiyur Reserves. The forested areas of North Wayanad (except Manantha-vadi Range) and Kannur Divisions, and Protected Areas of Aralam and Tholpetty Ranges fall within this elephant range. The habitat is contiguous with the Nagarhole National park of Karnataka.

2. The Wayanad Population

The Wayanad population forms a part of the largest elephant population in South India distributed in the forests of Karnataka, Tamil Nadu and Kerala. The Protected Areas of Wayanad Wildlife Sanctuary and forests of Chedaleth Range of South Wayanad form the habitat. The habitat is discontiguous due to the Pulpally encroachments and the habitations all along Kabani. Thus the Chedaleth Range and other parts of this region are not contiguous in Kerala.

3. The Kuttiyadi Population

This population is confined to the smaller areas lying south of Periya Range and extends upto the Ghat Road from the plains to Wayanad. The forests of Mananthavadi, Kuttiadi, Peruvannamuzhi and part of Thamarassery Range forms the habitat.

4. The Meppadi Population

This population comprises the elephants seen in the Forest Ranges of Meppadi, Nilambur, Edavanna, Vazhikadavu and part of Thamarassery extending upto Nilambur - Gudalur road.

5. Silent Valley - Nilambur Population

Elephants in the forests of Nilambur South, Silent Valley Forest Divisions and, Attappadi and Mannarghat Ranges of Mannarghat Forest Divisions form this population. The area is contiguous with Nilgiris on the north east.

6. The Palghat Population

The population occupies the forests of Muthikulam Reserve and extends upto Walayar and Olavakkode. The area is contiguous with Attappadi through a narrow strip of forests of Tamil Nadu on the east.

7. The Anamalai Population

This is one of the most viable populations in the Western Ghats and is distributed in the Forest Divisions of Parambikulam, Nemmara, Trichur, Chalakkudi, Vazhachal, Malayattur, Kothamangalam, Munnar and part of Idukki (Wildlife). The habitat is contiguous with Indira Gandhi Wildlife Sanctuary and Palani Hills of Tamil Nadu.

8. The Idukki Population

This population is confined to a small island of forests under the administrative control of Idukki Wildlife Division, Ayyappankoil and Nagarampara Ranges of Kottayam Division and part of Kothamangalam and Munnar Divisions.

9. The Periyar Population

Periyar population is distributed from the Periyar Tiger Reserve and extends upto Shencottah pass in the South. The Varashunad Hills and the High Wavys of Tamil Nadu are contiguous with the area. The Forest of Periyar Tiger Reserve, Ranni, Konni, Punalur and Achankovil Divisions forms the major habitat of elephants in this area.

10. The Agasthya Population

This is the Southernmost population of elephants in Kerala and comprises those seen in Thenmala, Trivandrum and Trivandrum (Wildlife) Divisions. The area is contiguous with Kalakkad - Mundanthurai of Tamil Nadu and is part of Ashambu Hills.

STATUS OF ELEPHANTS IN KERALA

The status of elephants in the State was assessed in 1993 using total count, dung count and line transect methods. The forest areas in the State were divided into different regions based on contiguity of habitats and trained Volunteers and Forest Officials collected the required information to estimate the population.

Habitat wise analyses of the data were done to estimate the density of elephants in different habitats. The estimated number of elephants in the State was 4,286. Region-wsie density analyses using dung count method indicated the highest density of 2.74/km^2 in Bathery region comprising Muthanga, Sulthan Bathery and Kurichiat Ranges. The high density was attributed to the large scale movement of elephants from the adjoining Mudumalai and Bandipur. Silent Valley-Nilambur and Anamalai-Nelliampathis recorded a density of 0.80/km^2 and 0.68/km^2. This was followed by North Wayanad (0.64/km^2), Periyar-Ranni (0.61/km^2), Idukki (0.48/km^2) and Palghat Hills (0.35/km^2), Kuttiadi and Agasthyamalai regions recorded 0.20 elephants/km^2 each. Meppadi region had the lowest density of elephants (0.16/km^2).

An analyses of the data collected through total count showed an adult male-female ratio of 1:2.65 indicating a healthy population. The juveniles and calves formed about 10% and 12% respectively.

PROJECT ELEPHANT PROGRAMME

Elephant is a wide ranging animal requiring larger areas with large quantity of resources. Habit fragmentation and degradation coupled with poaching poses serious threat to the survival of this magnificent and majestic creature. Protected Areas have been insufficient to contain these and thus ensure long term conservation. The elephant symposium organized by Kerala Forest Department in February 1990 made several suggestions pertained to elephant conservation and was a major driving force in formulating a programme for elephant conservation. Considering the seriousness of the problem, a centrally sponsored scheme, **Project Elephant** was suggested by a Task Force and the programme was launched in 1991-1992. The major objective has been identified as 'Range Protection and Management'.

A number of Elephant Reserves have been identified by the Task Force for the implementation of the Programme. Eleven Reserves have been identified in the country based on the contiguity of habitat and viability of population. These Reserves are mainly located in the North East and South covering most of the elephant populations in the country. The report of the Task Force for **Project Elephant** identified the following Elephant Reserves in Kerala.

Reserve No.7 - Nilgiris and Eastern Ghats

Part of Karnataka, Tamil Nadu, Andhra Pradesh and Wyanad Sanctuary and adjoining areas such as, Alattur Reserve Forest, Tirunelli, Judrakote, Hilldale, Trissaleri, Harikara Shola, etc.

Reserve No.8 - Nilambur - Silent Valley - Coimbatore

Nilgiri South and Coimbatore of Tamil Nadu and the following areas of Kerala - Nilambur (including New Amarambalam, Karimpuzha and Nilambur Vested Forests), Palghat and Kozhikode (including Silent valley National Park, Attappady Reserve Forests, Muthikulam, Kallady upto Walayar, ex.- Manjeri Kovilakam and Nedunjechi).

Reserve No.9 - Anamalai - Parambikulam

Indira Gandhi Wildlife Sanctuary of Tamil Nadu and Parambikulam - Chimmoni Wildlife Sanctuary, Nenmara, Munnar (part) Chalakudy (part) and Malayattoor (part) of Kerala.

Reserve No.10 - Periyar - Madurai

Madurai South of Tamil Nadu and Periyar Tiger Reserve, Idukki Wildlife Sanctuary, Chinnar Sanctuary, Ranni (part), Kottayam (part), Konni (part), Achenkoil (part) and adjoining areas.

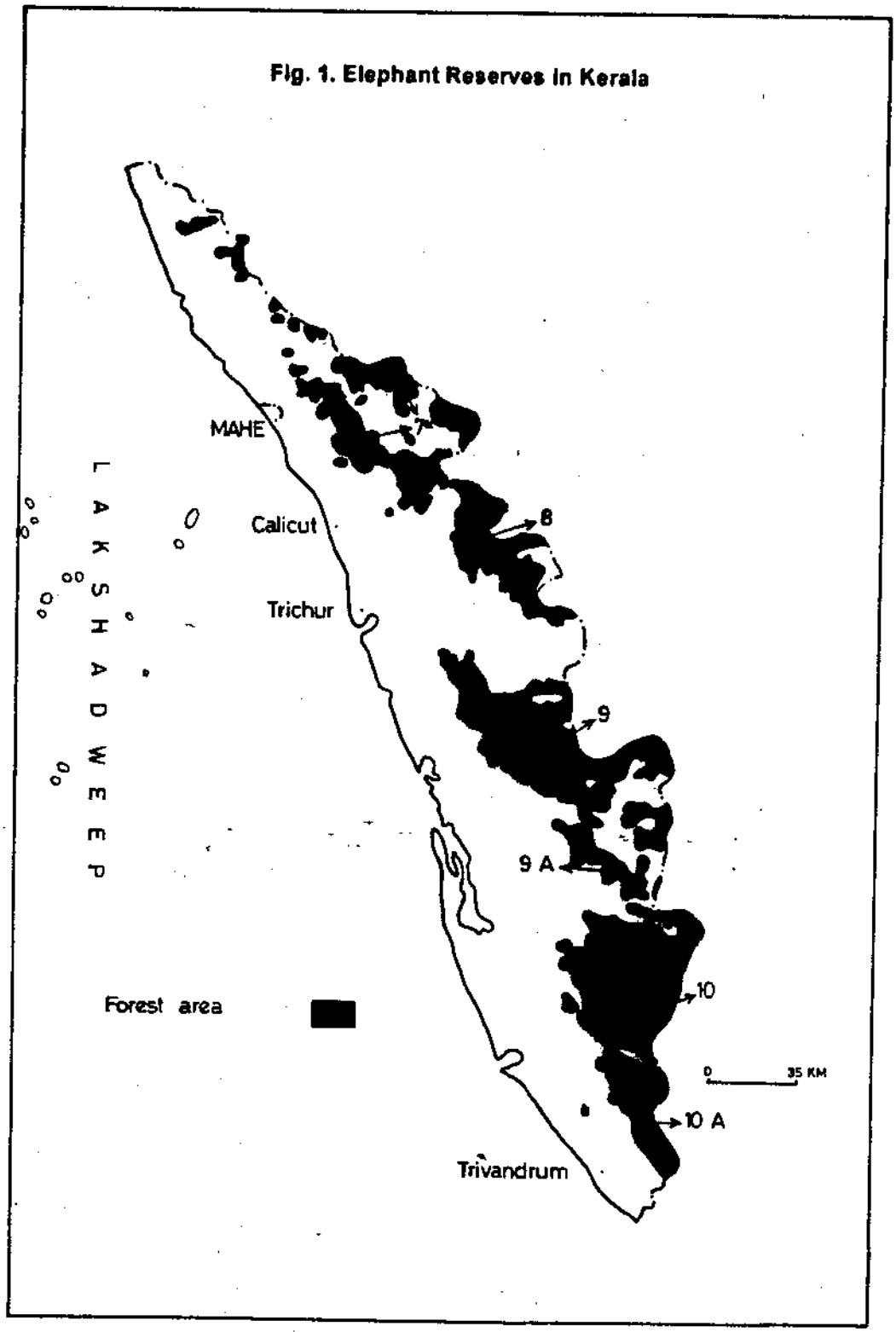
However, the grouping of areas in Kerala into Reserves unfortunately did not follow the contiguity of habitat. Thus the Chinnar and Idukki areas were included in Reserve No. 10 - Periyar-Madurai.

Thus, based on detailed field studies, and contiguity of habitat and viability of population, the following Elephant Reserves have been identified in Kerala for inclusion in the Project Elephant Scheme (Table 1, Fig.1).

Table 1. Abstract of Elephant Reserves in Kerala

Reserve No.	Forest Divisions	Approximate Area in Km^2
7	Kannur, North Wayanad, South Wayanad, Wayanad (WL) and Kozhikode	1200
8	Nilambur South, Nilambur North, Silent Valley, Mannarghat, Palghat	1650
9	Parambikulam, Nemmara, Chalakudy, Thrissur (part), Vazhachal, Malayattur, Kothamangalam (part), Munnar, Mankulam, Idukki (WL)	2800
9A	Idukki (WL), Kottayam (part), Kothamangalam (part)	400
10	Periyar Tiger Reserve, Ranni, Konni (part), Achenkovil, Punalur (part), Kottayam (part)	2400
10A	Trivandrum, Trivandrum (WL), Thenmala	650

Fig. 1. Elephant Reserves in Kerala



Reserve No.7 -Forests falling under North Wayanad, South Wayanad, Wayanad (Wildlife), Kannur and Kozhikode Forest Divisions.

This forms a large area with contiguous forests of Karnataka and Tamil Nadu.

Reserve No.8 - Forests of Nilambur South and North, Silent Valley, Mannarghat and Palakkad Forest Divisions.

One of the most crucial elephant habitats contiguous with Tamil Nadu.

Reserve No.9 - Forests of Parambikulam, Nemmara, Chalakkudi, Vazhachal, Malayattur, Kothamangalam, Mankulam, Munnar Divisions and Chinnar Wildlife Sanctuary.

A large Conservation Unit with a viable population.

Reserve No.9A - Forests of Idukki Wildlife Sanctuary, part of Kottayam and Kothamangalam Divisions.

An isolated population requiring management programme.

Reserve No.10 - Periyar, Ranni, Konni, part of Punalur, part of Kottayam and Achenkoil Divisions.

A large contiguous area holding a viable population.

Reserve No.10A - Forests of Thenamala, Trivandrum and Trivandrum (Wildlife) Divisions.

Contiguous with Kalakkad-Mundanthurai and reported to have dwarf elephants, the only one of its kind in the elephant ranges.

ELEPHANT RESERVE NO. 7

The Elephant Reserve, consisting of the elephant habitats in Kerala, Tamil Nadu, Karnataka and Andhra Pradesh, is considered to be the largest one based on the elephant population. The Kerala part of the Reserve comprises mainly Wayanad, an area contiguous to Bandipur Tiger Reserve and Nagarhole National Park of Karnataka and Mudumalai Wildlife Sanctuary of Tamil Nadu. The Reserve falls between 11° 20' and 12° 7' N Lat. and between 75° 28' and 76° 36' E Long (Fig.2). This includes the forests under the administrative divisions of South Wayanad (except Meppadi Range), Wayanad Wildlife Sanctuary, North Wayanad, Kannur and Kozhikode. The Reserve Forests of Hill Dale, Tirunelli, Kannavam, Kottiyur, Periya, Begur, Edakkode, Kartikulam, Kudirakode, Padiri, Kurichiat, Kuppadi, Rampur, Alathur, Kallur, Mavinahalla, Edathara, Nulpuzha, Nemminad and Lady Smith form the major portion of this part of the Elephant Reserve. The total extent in the Kerala part is about 1200 Km^2 of which 394 Km^2 form the Wayanad Wildlife Sanctuary alone. Detailed area and habitation maps are given as Appendix. A major portion of the area is under Nilgiri Biosphere Reserve. The major Reserve Forests and their extent is given in Table 2.

The east sloping Wayanad plateau and the Western slope of Wayanad differs in topography and climate. The Wayanad plateau is at an elevation of 900-1000 M. The average rainfall in this tract is about 2000 mm and the temperature varies between 13° C to 32° C. The northern part of Wayanad differs from the southern part of the plateau in that the elevation ranges from 700-1600 M. The South Western slope is composed of uneven peaks ranging from 1000-2000 M.

The northern part is drained by Aralampuzha. The Bavali river, originating from Tirunelli Reserve flows through Kudirakode and Begur Reserves joining Kabani. A portion of the Kurichiat Range is drained by Kannarampuzha and Kurichiat river and joins Kabani. The Kabani river flows towards east. The southern part, the driest tract in the plateau, is drained by Nulpuzha and Mavinahalla Thodu. The south western slope is drained by West flowing Kuttiadi river and the east flowing Mananthavadi-river.

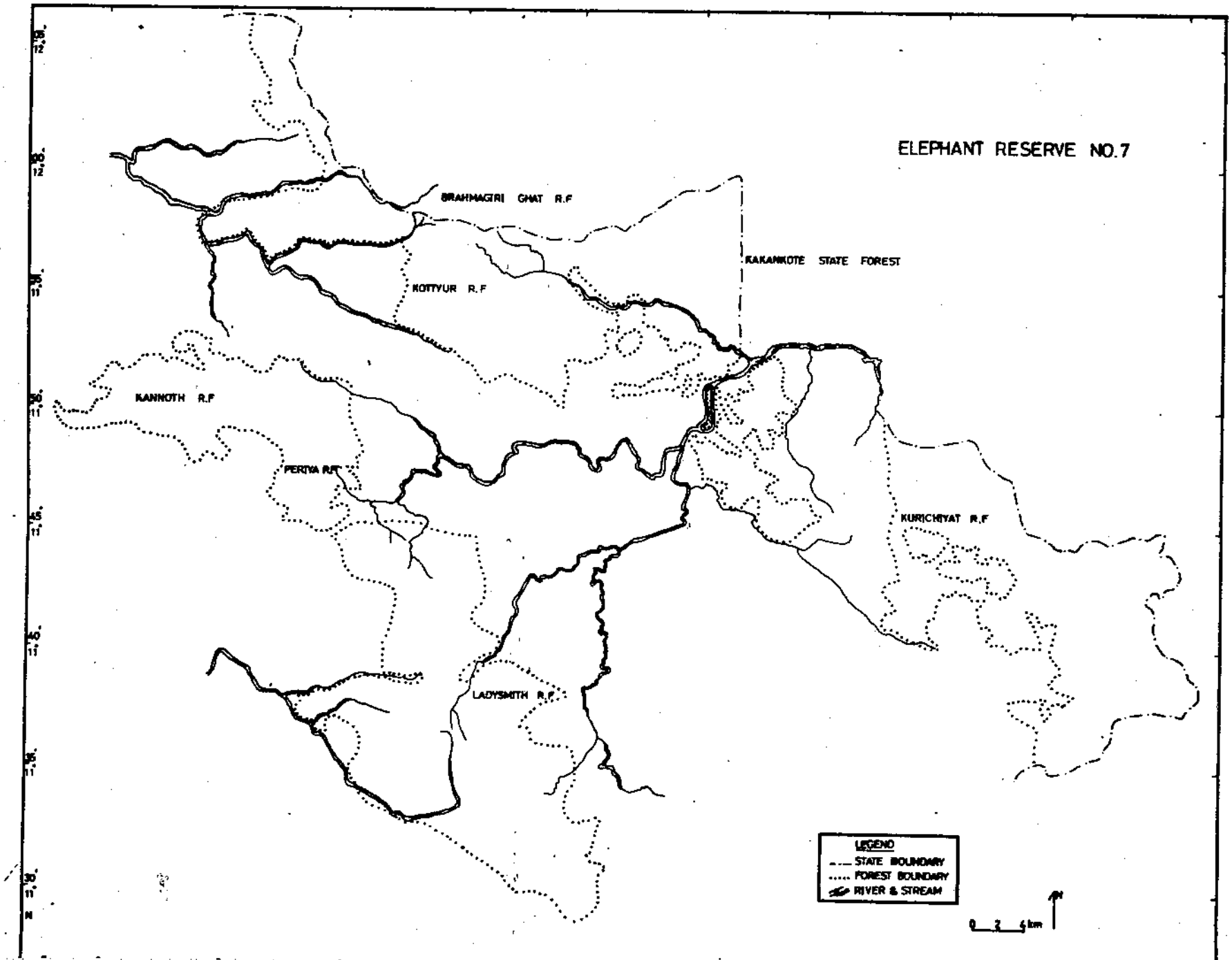

ELEPHANT RESERVE NO.7
BRAHMAGIRI GHAT R.F
KAKANKOTE STATE FOREST
KOTTYUR R.F
KANNOTH R.F
PERIYA R.F
KURICHIYAT R.F
LADYSMITH R.F
LEGEND
STATE BOUNDARY
FOREST BOUNDARY
RIVER & STREAM
0 2 4 km

Table 2. Details of Major Reserve Forests in Elephant Reserve No. 7

Sl. No.	Name of R.F.	Area (km^2)	Sl. No.	Name of R.F.	Area (Km^2)
1.	Kottiyur	55.50	15.	Shanamangalam	1.77
2.	Kannoth	84.35	16.	Thirunelli	20.54
3.	Kannoth Extension	4.49	17.	Trissaleri	4.49
4.	Peria	56.15	18.	Edathara	2.38
5.	Alathur	4.97	19.	Kallur	8.41
6.	Begur	61.88	20.	Kuppadi	32.04
7.	Edakad	0.71	21.	Kurichiat	74.42
8.	Hariharashola	1.93	22.	Kuruva	1.46
9.	Hilldale	30.56	23.	Ladysmith	13.51
10.	Kambamkala	6.37	24.	Mavanhalla	52.43
11.	Kartikulam	3.12	25.	Nemminad	3.74
12.	Kudrakote	14.26	26.	Nulpuzha	15.75
13.	Oliot	2.58	27.	Padiri	52.63
14.	Outangadi	1.40	28.	Rampur	72.85

A Brief History

Wayanad was once the land of swamps, with extensive forests forming a contiguous block with the adjoining forests of Karnataka and Tamil Nadu. Most of these forests were under private ownership. The Reserved Forests were scattered and existed as islands. The cultivable portions of these forests were opened up for food production. Large scale conversion of natural forests to teak plantations was carried out. The migration of people from the plains lead to encroachments of private forests and the cultivation in the swamps led to further degradation of the forests. Luxuriant growth of bamboos existed in the forests. Bamboos were worked down for industrial purposes. More areas were converted for eucalypts plantations. The settlements and enclosures, their dependence on forests, the over exploitation of the resources for industrial purpose, modern agricultural practices - all contributed to the degradation and fragmentation of the once vast expanse of contiguous moist deciduous forest.

At present, the forests of Wayanad could be considered as three segments.

Kurichiat-muthanga Segment

The first segment comprises the forests of Muthanga, Sulthan Bathery and Kurichiat Ranges. The segment starting from Nulpuzha Reserve, extends through the Kerala-Karnataka-Tamil Nadu trijunction to the Kabani river bank. Its contiguity with Padiri Reserve of Chedaleth range is lost due to encroachments of Pulppally forest areas. However, contiguity is maintained through the forests in Karnataka side. Padiri Reserve, a narrow strip of forests is bordered by Kabani river, both sides of which are under cultivation. A major portion of the segment is bordered by the forests of Mudumalai Wildlife Sanctuary and Bandipur Tiger Reserve. The segment is highly irregular in shape with enclosures and settlements scattered within the Reserve.

The forest in Muthanga and Sulthan Bathery Ranges represents one of the best examples of deciduous forests in the State which is comparatively undisturbed. A major part of the segment is under teak plantations. Presence of extensive bamboo breaks is one of the most important characteristics of the segment.

The entire stretch of forests in the segment is dry and forest floor is devoid of much vegetation. Preliminary studies have indicated that there is lack of grass growth and other fodder species preferred by elephants. The over grown intertwined clump forming bamboos, though found in plenty, will not be available to wildlife especially the elephant, gaur and sambar deer. The gregarious flowering and consequent removal of bamboos aggravate the problem further. There is an intense competition for the available food resource by the wildlife and the cattle population maintained by the people. The forests surrounding the villages bear a barren look due to overgrazing by the cattle. The migration of animals from the adjoining forests of Karnataka and Tamil Nadu during the pinch period makes the situation worse.

Water becomes very scarce due to the conversion of water available swamps for cultivation. Fire is an important causative factor for the degradation of habitat. The innumerable number of enclosures result in human activity through out the year. The roads and trek-paths in the forests are the common paths to settlements and enclosures. Controlling their movement would be very difficult. Control of this movement will help to control fire in the forests.

Begur-brahmagiri Segment

The second segment in Wayanad extends from the Shanamangalam - Kartikulam Reserve forests through highly fragmented patches to the forests of Begur, Tholpetty, Periya, Kottiyur, Kannavam and Aralam Forest Ranges. This segment is contiguous with Kakanakote Reserve Forests and Nagarhole National Park of Karnataka. This is a comparatively less disturbed part with comparatively fewer number of enclosures and settlements.

The forests in the segment is mainly of evergreen, semievergreen and shola-grassland types. The evergreen, semievergreen forests are confined mostly to the north-west and Western portions. The forests in Tholpetty Range on the eastern part is mainly of deciduous types. A major part of the segment especially falling in Tholpetty and Begur Ranges has been converted to plantations.

The contiguity of this segment with the first one is lost between Padiri and Shanamangalam forests due to encroachments all along the Kabani river. Further, the area is protected through live-wire fencing all along. The fragile unique eco-system in the Kuruva island is also threatened due to the human pressure from both sides of the river.

The major source of disturbance to the habitat in the segment is the exploitation of flowered bamboo and the eucalypts for the industrial purposes. Annual fire adds to the problem. The drier tract in Tholpetty is more prone to fire and the scarcity of water is much felt during the dry season. Western part is wetter with more of evergreen patches. Part of Periya, Kannavam, Aralam, Kottiyur and Begur are highly degraded due to the habitations and fire occurrence.

Kuttiadi Segment

The contiguity of the former segment with Kuttiadi region is lost due to the encroachments along the Kuttiadi-Mananthavadi road. However, a narrow strip of forest of about 100 m width, though degraded, retain the contiguity of the segment with Kuttiadi region at Pakranthalam. The Kuttiadi segment includes the areas under Kalpetta, Mananthavadi, Kuttiadi, Peruvannamuzhy and part of Thamarassery Forest Ranges.

This segment has remnants of well preserved patches of evergreen forests in the upper reaches on the Western edge of Wayanad plateau and extends upto the Kuttiadi hydro-electric project areas. The developmental programmes and encroachments have lead to the degradation of forests in the lower areas. A large extent of the erstwhile vested forest has been planted with eucalypts. A part of the vested forest is highly degraded and the region has become dry mainly due to fire.

The Elephant Population

Though disturbed and degraded to a great extent due to various reasons, Wayanad remains as one of the best elephant habitats. The contiguity with the forests of adjoining state makes it one of the crucial habitats for conservation of elephants. Large scale migrations of animals from adjacent areas to Wayanad plateau have been reported during dry seasons.

Density of elephants in the area was estimated in May 1993. The first segment, forming a part of Mudumalai-Bandipur Wayanad Complex had a density of 2.74/Km^2. The second and third segments had a density of 0.64/Km^2 and 0.20/Km^2 elephants/Km^2 respectively. The overall male-female sex ratio for the Elephant Reserve was 1:3.2. The elephants are using more of deciduous patches than the evergreens. There is a large scale movement of animals from the adjoining Tamil Nadu and Karnataka Forests. The congregations due to migrations in the dry season, coupled with scarcity of food and water often lead to overutilization and consequent further degradation of the habitat.

Some of the areas in the Reserve have been rarely used by elephants due to various reasons. The Kallur Reserve Forests contain 64 lease holds. Alathur, Edathara and Nemminad Reserve Forests are some of the few Reserves rarely used due to food shortage. The area between Madamangalam of Chethaleth Range and Padiri Reserve used to be a migratory route of elephants till 1962. This area has been later converted to teak and coffee plantations and now is no longer used by the elephants. However, a herd of elephants enroute crossed this area once in 1990.

Other Wildlife in the Reserve

The areas falling under the Reserve have almost all the representative fauna reported from Peninsular India. Gaur, Sambar deer, Spotted deer, Barking deer,

Mouse deer and Wildboar are the major herbivores. Tiger, Leopard Wild dog and Sloth bear are common in the area. The arboreals include Lion-tailed macaque, Bonnet macaque, Nilgiri langur, Common langur, Malabar giant squirrel and Flying squirrel.

Human Habitations

The history of the Wayanad has been of encroachments, conversion of natural forests and over-exploitation of forest resources. The habitations within the Reserve and the adjacent areas are shown in the map given in the Appendix. These include both tribals and non-tribals. The land tenure in these settlements falls under different categories viz. Patta land, Revenue land, leased area and the tribal land with no absolute right over them. There are about 103 tribal settlements in the first segment occupying about 600 acres. The tribal settlements in the second segment are 63 and occupy approximately 700 acres. There are only four tribal settlements in the third segments. The majority of tribals in the area are Kurichiars, Paniyars and Kurumbas. Chettys, though not classified as tribals, belong to one of the earliest settlers in Wayanad.

The major crops cultivated in the area include coffee, pepper, tapioca, banana, ginger and paddy. An analysis of the data on tribal communities alone indicate that approximately 2100 house holds depend exclusively on surrounding forests for fuelwood. There are about 800 and 475 households which depend on forests for fodder and green manure respectively.

The fragmented and degraded nature of the habitat, the innumerable number of settlements and the competition for the scarce resource by the people and the wildlife often lead to perpetual conflict between man and wildlife.

The Man-wildlife Conflict

Incidence of loss of life and crop damage due to wild animals in general and elephants in particular have been a serious management issue in the Wayanad. A total of 1135 claims have been reported from the Wildlife Division alone during the period between 1985-1992. This includes applications for compensation for life (9 Nos.), injury (30), incapitation (2), crop loss (1066) and loss of houses (28). Analysis

of the data for Ranges in the Wildlife Division indicate that the compensation claims have been on the increase since 1986 even after providing protection to some of the areas through live-wire fencing (Figs. 3 and 4). The total amount claimed in Tholpetty in 1992 alone was about Rupees ten lakhs. This increasing trend in the compensation has also been reported from other Forest Ranges as well. Interestingly, there had been claims for crop damage even from live wire fenced areas.

Various reasons have been attributed to the man-wildlife conflict in the area. The habitat is fragmented due to enclosures and settlements. The wet areas have been brought under cultivation depriving the animals the much needed water. The people depend on the forest to a great extent for fuel wood, fodder and green manure. Cattle grazing turned the surrounding forests to barren areas. Elders among the tribals point out the conversion of natural forests to plantations as the major cause of degradation of the habitat ultimately forcing the animals to enter the settlements for raiding crops. Preliminary studies on the biomass availability in the forests of Wildlife Sanctuary show lack of fodder species in the area. Added to these, monthwise analyses of crop damage compensation claims indicate that most of the damages are during the dry season which coincides with movement of animals to these areas from adjoining forests of Tamil Nadu and Karnataka (Figs. 5 and 6). There had been a shift in the agricultural practice in the whole of Wayanad from paddy to cash crops such as coffee and pepper. This is also considered to be a major factor for the increasing trend of man-wildlife conflict. The problem seems to be a complex one having combination of factors starting from fragmentation, conversion and the resultant degradation of natural habitat and to the change in the agricultural practices. The changing attitude of man and his reluctance to live in harmony with wildlife has also contributed to the problem. It is necessary to remove the existing problems to wildlife by facilitating continuity of forests, providing the required drinking water facility and also by improving the habitat for better food availability.

The crop-damage compensation rules of the State allow payment of compensation only for the damage due to elephants. The damages due to wildboar and sambar are reported to be a year round menace. The agitations of the public demand payment of compensation for damages by all wild animals.

Fig No. 3. Compensation Details

Rathery Area (Raty, Kurl. & Muthanga)

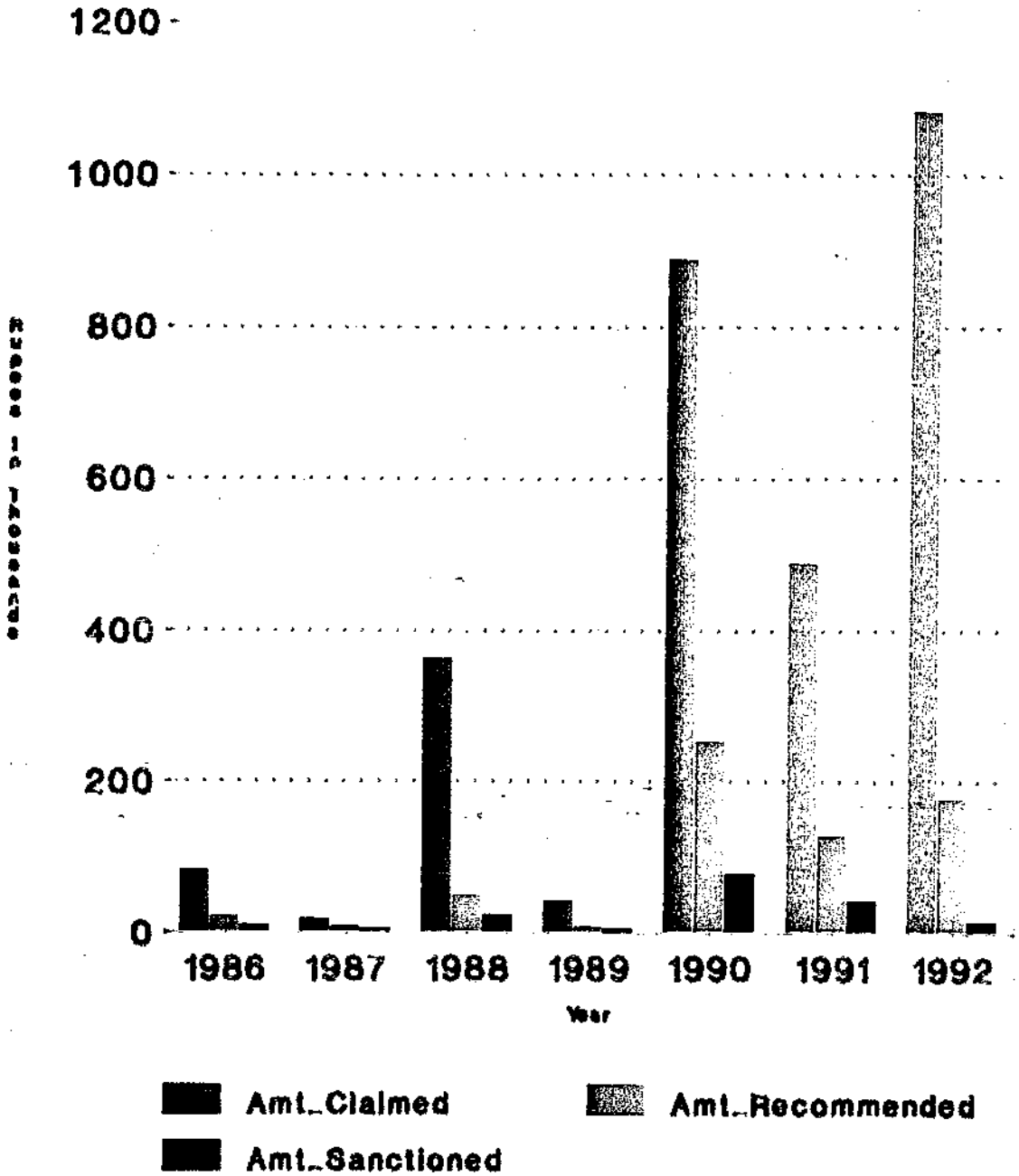


Fig. 4. Compensation Details

Wayanad Area (Tholpetty & Chethalayam)

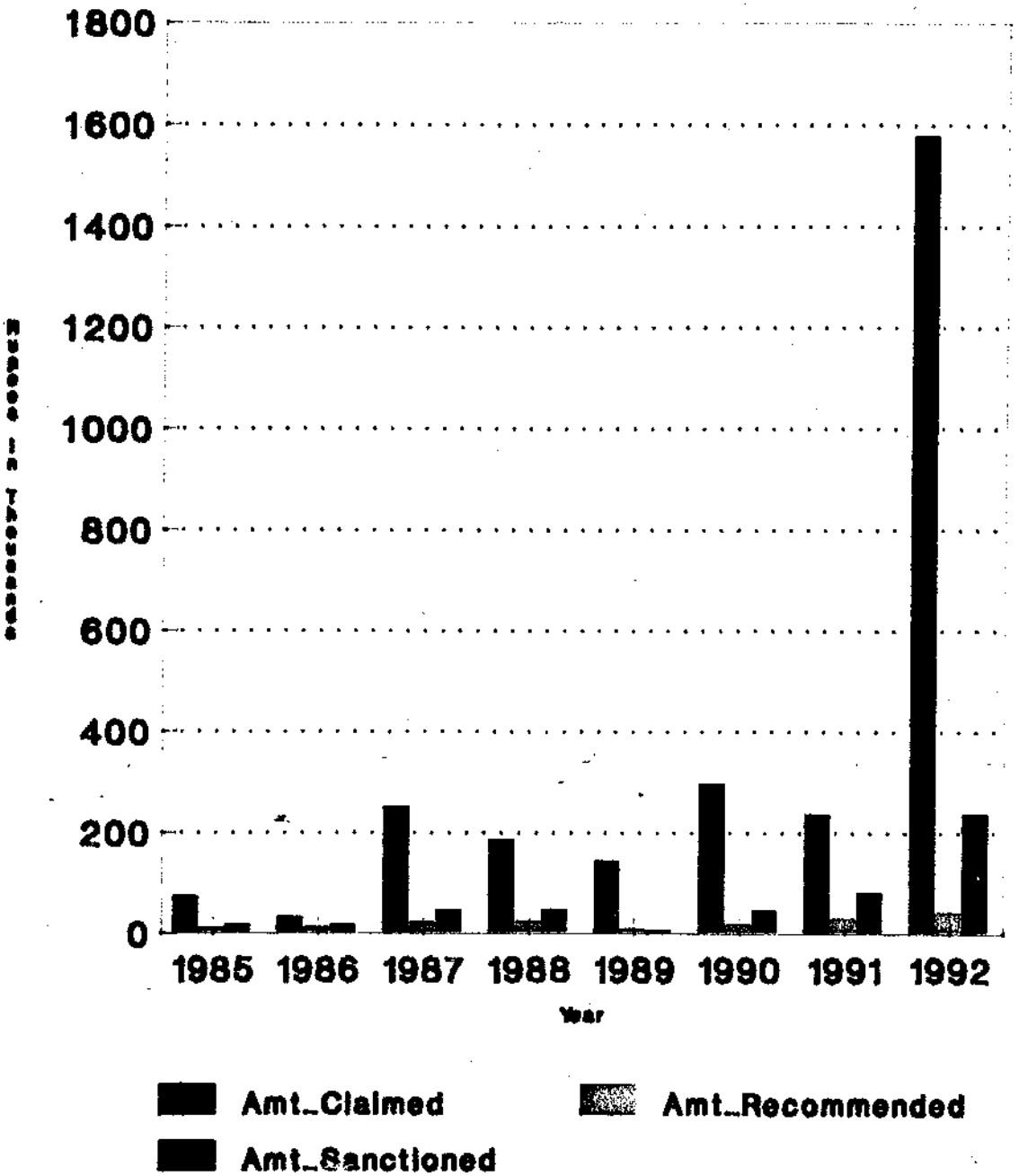


Fig. 5. Compensation Details

Kurichiat,Muthanga & Bathery Ranges

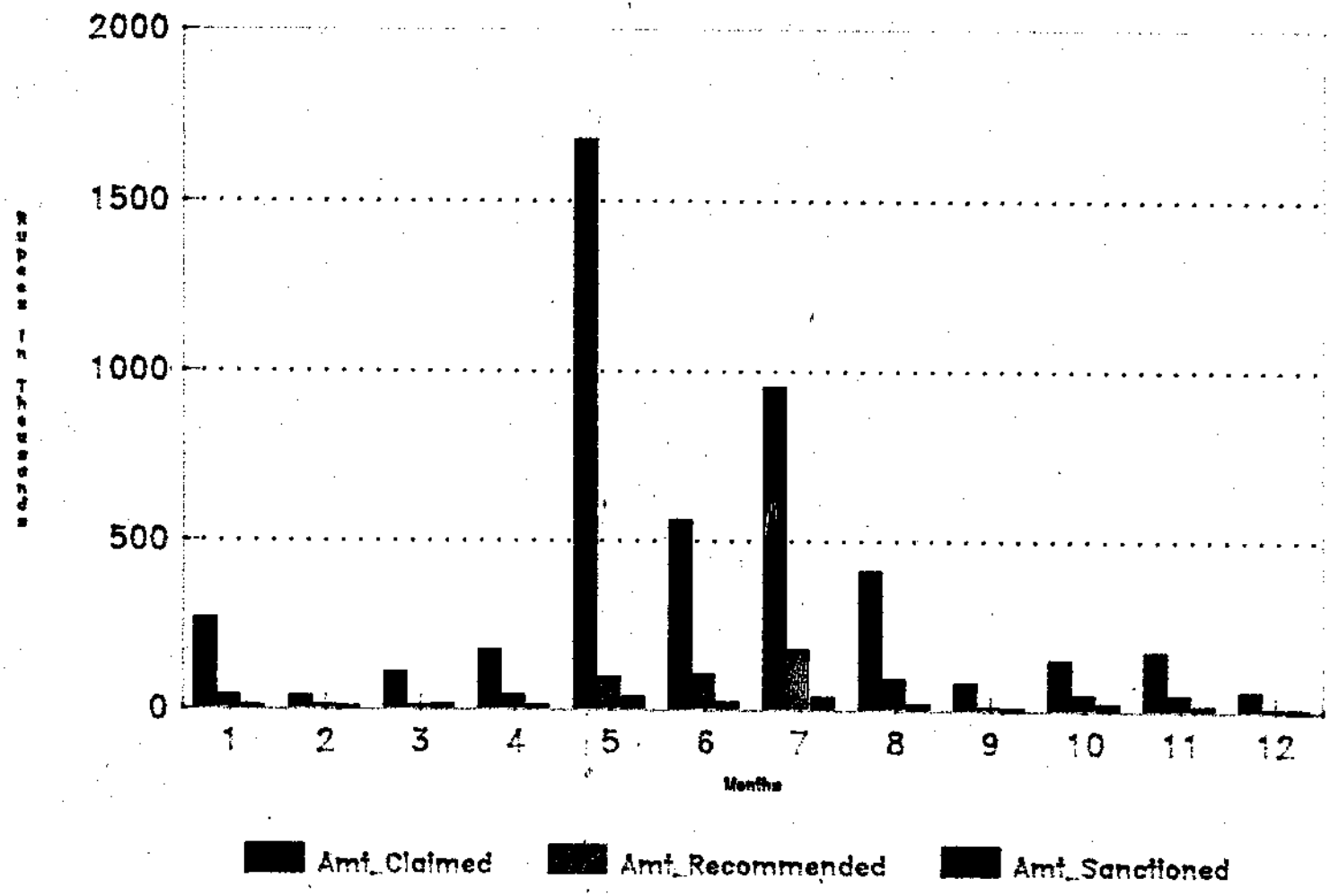
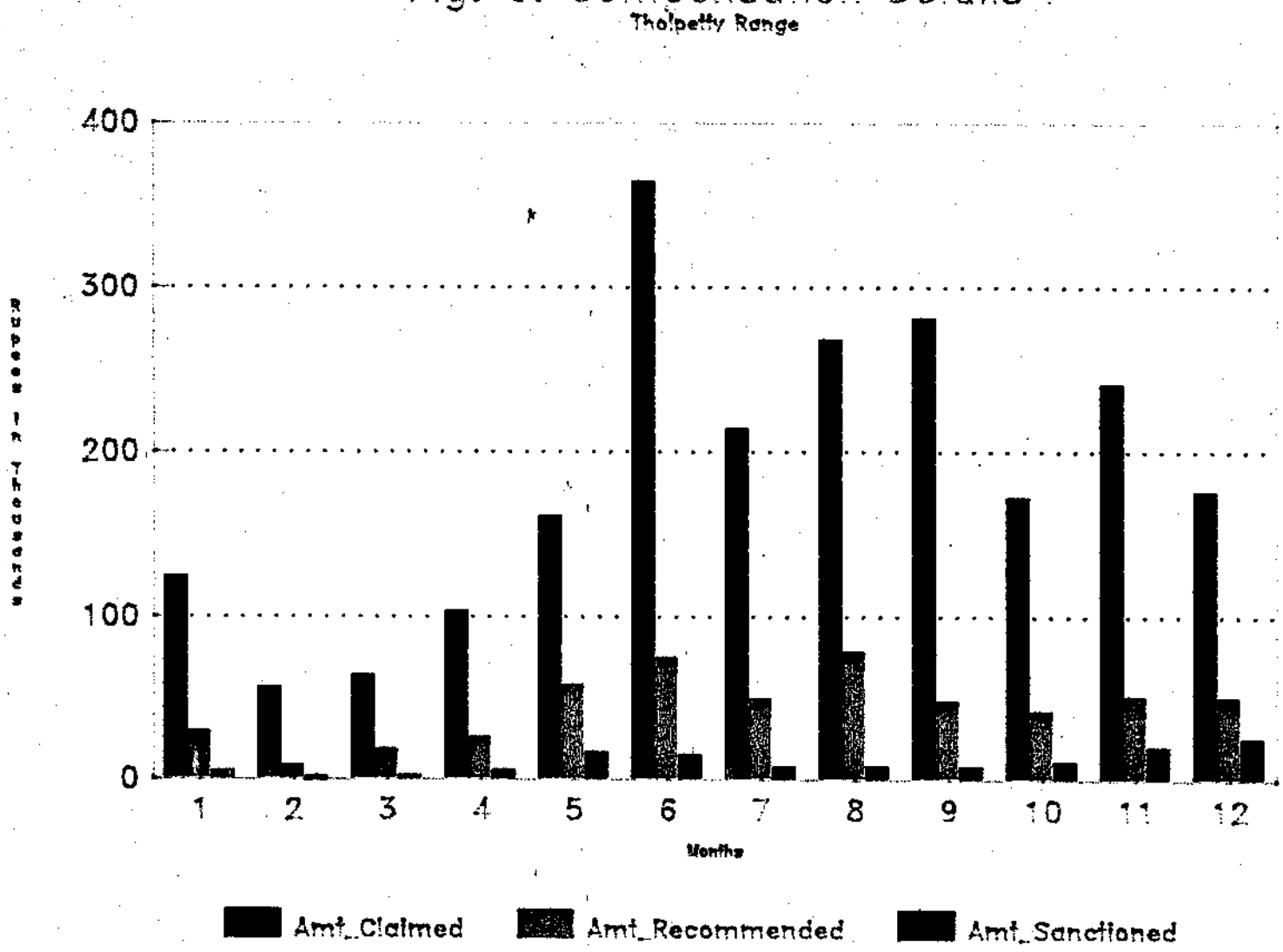


Fig. 6. Compensation Details



MANAGEMENT PROBLEMS

Considering various aspects, the following problems needs immediate attention for management of the Reserve.

1. Discontiguity of habitat

Establishment of contiguous and undisturbed habitat is the most important requirement for long-term conservation of a viable population of elephants.

2. Human settlements and biotic pressure

The innumerable number of settlements and enclosures within the Reserve is a major threat to conservation. These people depend on the surrounding forests for fodder, firewood, green manure and other requirements. Cattle grazing in the forests lead to unhealthy and unnatural competition with wild animals.

3. Habitat degradation

The dry and barren forest floor point to the lack of food and water within the Reserve. The gregarious flowering of bamboos, conversion of natural forests and over-exploitation of natural resources have added to the problem. Fire is an important factor for habitat degradation.

4. Soil and Moisture Conservation

Soil erosion is an important cause of habitat degradation in most parts of the Reserve. Lack of soil moisture also could be a reason for the increased crop damage incidences and lack of fodder species.

5. Crop-damage

Crop-damage has become the most important management problem requiring immediate attention. This would also lead to good public support for the cause of conservation.

6. Protection of animals

The presence of enclosures and the surrounding villages pose major threat to the animals. Though poaching cases have been very few, strict vigilance is required due to easy accessibility through the roads.

7. Animal health and Research

Most of the death of animals are not properly monitored to assess the cause. Further, the requirements of each species competition between different species and other details are also lacking.

RECOMMENDATIONS

Establishment of corridors and rehabilitation of settlements

Considering the discontinuous habitat due to fragmentation and scattered enclosures and settlements inside the forests, the most crucial requirement for conservation of the Elephant Reserve is to create contiguous habitat through corridors for facilitating undisturbed movement of elephants. Two most important areas have been identified for the establishment of corridor - 1) areas between Padiri Reserve Forests of Chedaleth Range and Shanamangalam Reserve of Begur Range 2) The areas at Pakranthalam between the second and third segments.

Padiri-Shanamangalam Corridor

The contiguity between these two areas has been lost due to human habitation on both sides of Kabani river. The entire stretch of the river bank, both in Kerala and Karnataka part is under cultivation. The paddy fields of about 500 m width are protected by live-wire fences for a length of 27.5 Kms leaving a gap of 50 m at Kakkeri for elephant movement. The elephants cross Kabani river at Vettathur and in most of other areas they cross by damaging the live-wire fence. Establishment of a corridor in the area will require acquisition of about 320 ha of land (including 300 houses, 115 ha of land under dry cultivation and 75 ha under paddy) at the shanamangalam side of Begur Range. An equal extent has to be acquired on the

Chegadi side of Kabani river adjoining Padiri Reserve of Chedaleth Range. A majority of the people have expressed theis willingness to move out of the area.

Periya-Pakranthalam Corridor

Lone tuskers have been reported to cross the Kuttiadi- Mananthavadi road at Pakranthalam. Such seasonal movements from Periya Range to Chembuchira are often in the midst of threat from the people residing in the adjoining areas. An area of about 100 ha of land may have to be acquired to widen the existing narrow strip of corridor.

Maintenance of existing corridors in Wayanad has to be given due importance. The area between Pallivayal and Thattur, a corridor connecting Kuppadi and Kurichiat Reserves, is about 2 Kms. wide with plantations all along the edge. Care has to be taken to avoid disturbances in this tract while taking up developmental programmes.

Further, an area of about 75 acres of land between Periya and Kottiyur Forest Ranges near Varayal Forest Station is under private ownership of 73 people. The owners (all non-tribals) have given written consent to move out of this area. Acquisition of these private holdings would add to the elephant habitat and avoid disturbances.

Approximately 150 acres of land in Ayyankavu area in Irutti section of Kottiyur Range may have to be acquired in order to remove a problematic settlement from the existing stretch.

The conservation efforts in Peruvannamuzhy, Kuttiadi and Thamarassery Forest Ranges are much more complex due to the legal complications in the erstwhile vested forest areas. A vast stretch of forest land will be cleared for cultivation due to handing over of forest land to the claimants following court verdict. This would lead to further fragmentation and degradation of the existing habitat. These may have to be acquired to maintain the contiguity of habitat.

Rehabilitation/Acquisition of Enclosures and Settlements

The scattered settlements and enclosures pose serious threat to conservation measures in the Reserve. The pressure on the forests surrounding habitations is a

major factor for degradation of habitat. Conflict of interests lead to crop damage and also disturbance to wildlife. Both the tribals and non-tribals have become so much fed up with the problem that a majority of them have expressed willingness to move out of the areas.

The willing tribals could be rehabilitated at the fringes without affecting their traditional way of life. About 600 ha of forest land could be retrieved through the process in the Wildlife Division alone. Further, the Pulayamkolli, Suldar Vayal, Edayur vayal and Malamthottam areas in Begur Forest Range may have to be acquired for resettlement. This would add an area of 18 ha lying scattered in North Wayanad Forest Division. The Binachi Estate, mostly of coffee plantations, near Meenangadi may be purchased for resettling the people. The estate is owned by the Madhya Pradesh Government.

Habitat Restoration

The habitats in the Reserve forests are highly degraded due to various factors as mentioned earlier. Intensive programmes have to be taken up for enriching the habitat and conserving soil moisture. Major food plants preferred by elephants are to be identified. Preliminary studies have indicated that *Kydia colycima* and grasses such as *Themeda* sp. form important food species in the deciduous forests.

There is scarcity of Bamboos, the most preferred food species, due to gregarious flowering and consequent exploitation for industrial purpose. Regeneration of bamboo would take a long time. Moreover, there has been large scale collection of bamboo seeds, and hence good regeneration cannot be expected. The natural associates of teak and other indigenous species may have to be identified and supplemented in the area to enrich the habitat. Sufficient fire protection measures will have to be taken to ward off fire from bamboo regeneration area.

Water is an important limiting factor in the drier areas. Year round water availability has to be ensured in different parts of the forests in order to ensure uniform distribution of elephants. This will avoid excessive aggregation of animals and overutilization of certain areas. This has to be attained by creation of new water

holes, staggered trenches and by desiltation and maintenance of the existing water holes.

Soil and moisture Conservation

Soil and moisture conservation through gully plugging, staggered trenches and maintenance of water holes would facilitate vegetation growth. This would also help in maintaining the animals within the Reserve without the crop-damage incidences.

PROTECTION FROM ANIMALS

Conservation measures require the support of the local people. The legitimate rights and demands of the people have to be met through appropriate programmes. The major threat to the people in the enclosures and settlements is the 'attack' by wild animals damaging houses and crops. A number of enclosures have been protected from the wild animals by live-wire fencing. Live-wire fences of about 104 kms. is installed in Wildlife Division. About 28 Kms long fence protect certain areas in Begur and Periya Forest Ranges. Elephant proof trench for a distance of 3.60 Kms. was made in Chegadi areas of Chedaleth Range in South Wayanad Division.

Additional areas may have to be protected through live-wire fencing and digging trenches. However, care has to be taken to avoid further hindrance to animal movement.

Payment of compensation for wildlife damage seems to pacify the agitating public to a great extent. A number of compensation claims have not been attended to due to lack of funds. Speedy redressal of the grievances through immediate payment of compensation has to be ensured.

Eco-development Programmes

The number of settlements and enclosures within and surrounding areas bring in lot of pressure on the habitat. A socio-economic survey of both the tribals and non-tribal settlements may be made to assess their dependence on forest resource and to have an understanding of their needs.

The villagers may be encouraged to have their own cattle grazing blocks and cultivation of fodder species. These may be funded and maintained through funding by the department. Further, the training in self supporting job oriented programme could be thought of Alternate energy sources, such as solar energy could be supplied to the villagers to reduce pressure on the forests. More employment may be generated for the people in the surrounding areas.

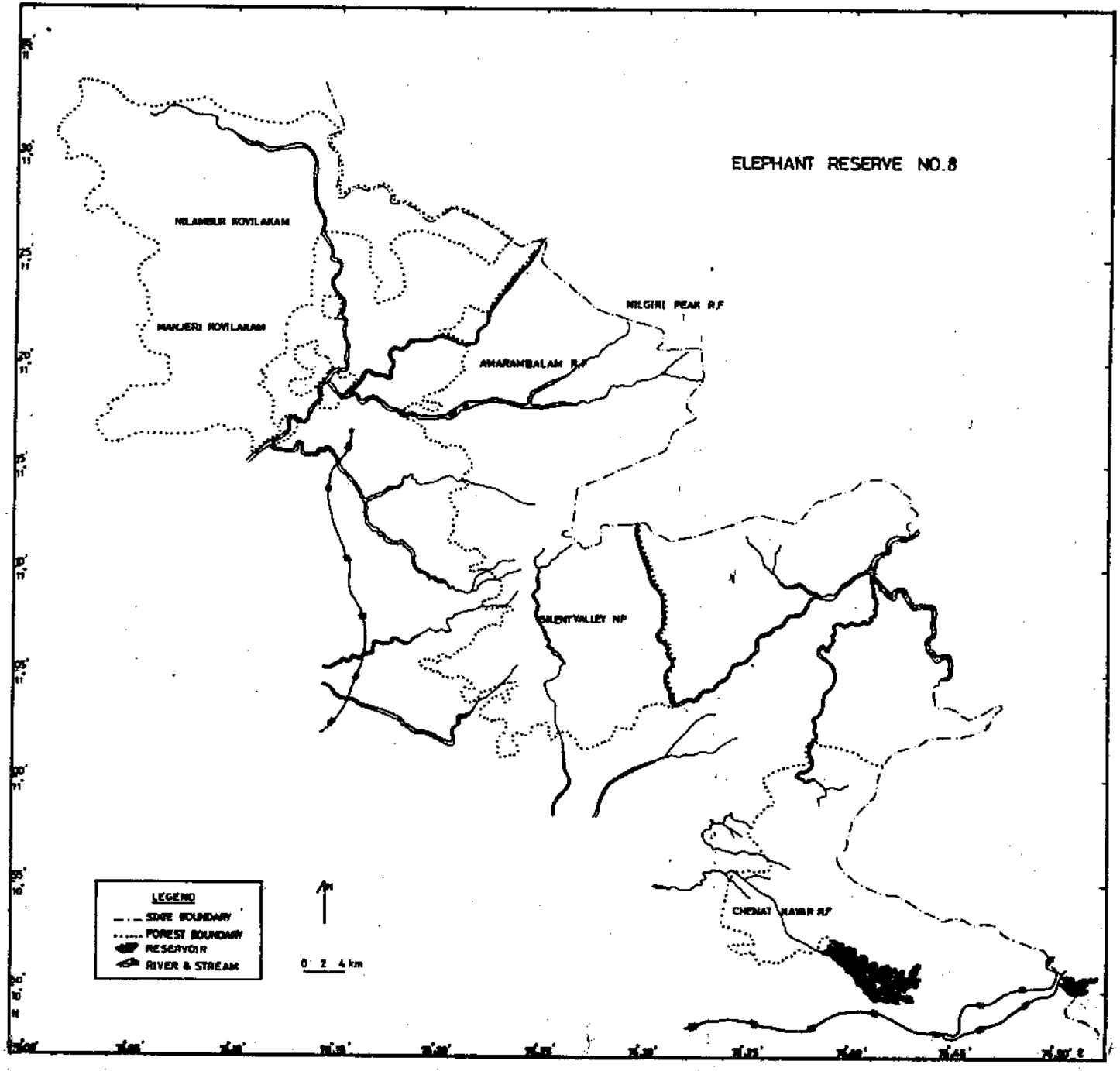
ELEPHANT RESERVE NO. 8

The Elephant Reserve includes areas north of Palghat gap extending upto the eastern border of Nilambur Valley (Between 10° 50' and 11° 33' N. Lat. and between 76° 2' and 76° 5' E. Long.) (Fig. 7). The Reserve could be considered as three segments. Details of the area is shown in the map in Appendix. 1. The Palghat Hills consisting of Walayar and Olavakkod Ranges of Palakkad Forest Division and Agali Range of Mannarkad Forest Division. 2. The Nilambur-Silent Valley part comprising Attappady and Mannarghat Ranges of Mannarghat Forest Division, Silent Valley Wildlife Division, Nilambur South Division. 3. The Meppadi Region including the Nilambur, Vazhikkadavu and Edavanna Ranges of Nilambur North Division, part of Thamarassery Range of Kozhikode Division and Meppadi Range of South Wayanad Forest Division. The total extent of this Elephant Reserve is about 1,650 Km^2 and includes about 150 Km^2 of plantations. The Reserve Forests of Walayar, Chenat Nair, Muthikulam, Attappady, Silent Valley, New Amarambalam, Erambadam, Kanakoth, Chatamburai Pokote, Nilambur Kovilakam, etc. (Table 3).

Table 3. Details of Major Reserve Forests in Elephant Reserve No. 8

Sl. No.	Name of R.F.	Area (km^2)
1.	Karimpuzha	16.06
2.	Old Amarambalam	1.97
3.	New Amarambalam	246.48
4.	Chenat Nair	60.81
5.	Puliampallitope	0.08
6.	Silent Valley	88.48
7.	Panakadan	4.93
8.	Attappadi	201.52
9.	Walayar	12.03

The topography is highly undulating and the elevation ranges from 50 M to 2,300 M. The rainfall varies from 1,000-2,000 mm depending on the area. The drier


ELEPHANT RESERVE NO.8
NILAMBUR KOVILAKAM
MANJERI KOVILAKAM
NILGIRI PEAK R.F
AMARAMBALAM R.F
SILENTVALLEY NP
CHEMAT MAYAR R.F
LEGEND
STATE BOUNDARY
FOREST BOUNDARY
RESERVOIR
RIVER & STREAM
N
0 2 4 km

part of Attappadi on the eastern side of Silent Valley receives less than 600 mm rain fall. The Nilambur Valley and the Meppadi regions receive 2,000-5,000 mm rainfall. The temperature variation is between 13° C and 26° C.

The Palghat Hills is drained by Walayar river, Malampuzha, Kanjirapuzha, Thuthapuzha, Siruvani and Tuppanadpuzha. The major rivers in Silent Valley - Nilambur and Meppadi regions include Kunthipuzha, Bhavani, Cherupuzha, Olipuzha, Velliyar, Karimpuzha, Punnapuzha, Vythiripuzha, Iruvanhipuzha, Chalipuzha and Arunapuzha.

Palghat Hills

This segment has a very extensive undistributed forests of Muthikulam, Walayar and Chenat Nair Reserves. Most of the lower areas of Walayar and Chenat Nair have been converted to plantations. The grasslands in Siruvani reservoir have also been planted with eucalypts. The higher elevation areas of Elival, Palamala and Karimala have undisturbed grassland-shola forests. A part of Walayar is highly degraded due to plantation activities and grazing. The areas around Siruvani dam is also degraded to certain extent and soil erosion is very evident in this part of the Reserve. The contiguity of this segment with the Nilambur- Silent Valley segment is lost due to encroachments, conversion and degradation all along the road from Mannarghat to Anakkatti. However, the contiguity is maintained through a degraded narrow strip of Thadagam valley and Gopanari Reserve Forests of Tamil Nadu joining with Attappadi portion.

Silent Valley-Nilambur Segment

This segment forms part of Nilgiri Biosphere Reserve and has the vast expanse of undisturbed vegetation mainly of evergreen type. The moist deciduous forest is confined to the lower areas of Nilambur and Mannarghat Divisions. The vegetation changes towards the higher reaches through semi-evergreen, evergreen and ultimately become shola forests at the highest points. New Amarambalam, Silent Valley and part of Attappady forms the largest undisturbed patch of evergreens. The forests of Mannarghat forests is highly degraded due to frequent fire and plantations. The lower areas of Nilambur are comparatively well preserved with teak plantations in some portions. The areas under Kalikavu is the most affected one due to closeness of human settlements and estates in the fringes.

The segment is contiguous with the Meppadi region but for the Nilambur-Gudallur road. Elephant movement across the road was frequent till the recent past. At present, only tuskers have been reported to move between these areas. The information is supported by lack of indirect evidences of elephant on both sides of the road. This may be due to the increase in vehicular traffic.

The Meppadi region

Most of the forests in this region are the private forests vested with the Government. The region has well preserved moist deciduous, semievergreen and evergreen forests in the north eastern region. Most of the forests in the Southern and Western margin have been extensively converted. The legal procedures pertaining to the vested forests is a real threat to the conservation programme.

Close proximity to villages has been the cause for most of the degradation in the southern most and western part of this region. Cattle grazing, exploitation of bamboo for industrial purpose and fire have almost devastated the undergrowth and prevented regeneration.

The Elephant Population

The Reserve harbours a good population of elephants in varying density in the segments. The Palghat Hills has a density of 0.35 elephants/Km^2. Silent Valley-Nilambur segment has the highest density of 0.8 elephants/Km^2 in this Reserve. Meppadi has only 0.16 elephants/Km^2. Karulai Range of Nilambur South and Silent Valley Division are the areas of higher elephant concentration positively due to the food and water availability as well as the least disturbance. Kalikavu and Olavakkode Ranges were utilized only minimally.

Other Wildlife in the Reserve

The area is faunistically very rich and diverse. Gaur, Nilgiri tahr, Sambar deer, Spotted deer, Barking deer, Mouse deer, Wild boar, Sloth bear, Tiger and Leopard are seen in the area. Leopard cat has been reported from Silent Valley. The Reserve holds a viable population of Lion-tailed macaque. A number of lesser forms have also been reported especially from Silent Valley.

Human Habitation

Most of the forest areas in the Reserve is devoid of human settlements within the Reserve. However, dependence on forest by the people in the adjoining villages is an important factor for degradation (Details of habitations in the map in Appendix).

MANAGEMENT PROBLEMS

Habitat degradation

Habitat degradation is the most important management problem of the Reserve. Most of Nilambur, Edavanna, Kalikavu, Attappadi, Mannarghat, Olavakod and Walayar Ranges are highly degraded due to occurrence of fire, weed and lack of water availability.

Protection of animals

The wildlife population in the area have been affected due to poaching incidences. A few cases of elephant poaching have also been reported in the recent past.

Dependence on forests

The people in the surrounding villages depend on the forest for fire wood and for collection of various forest produces for livelihood. This has an adverse effect on the habitat.

Maintaining contiguity

Some of the crucial areas within the Reserve would be lost due to court verdict following legal procedures. This would lead to fragmentation.

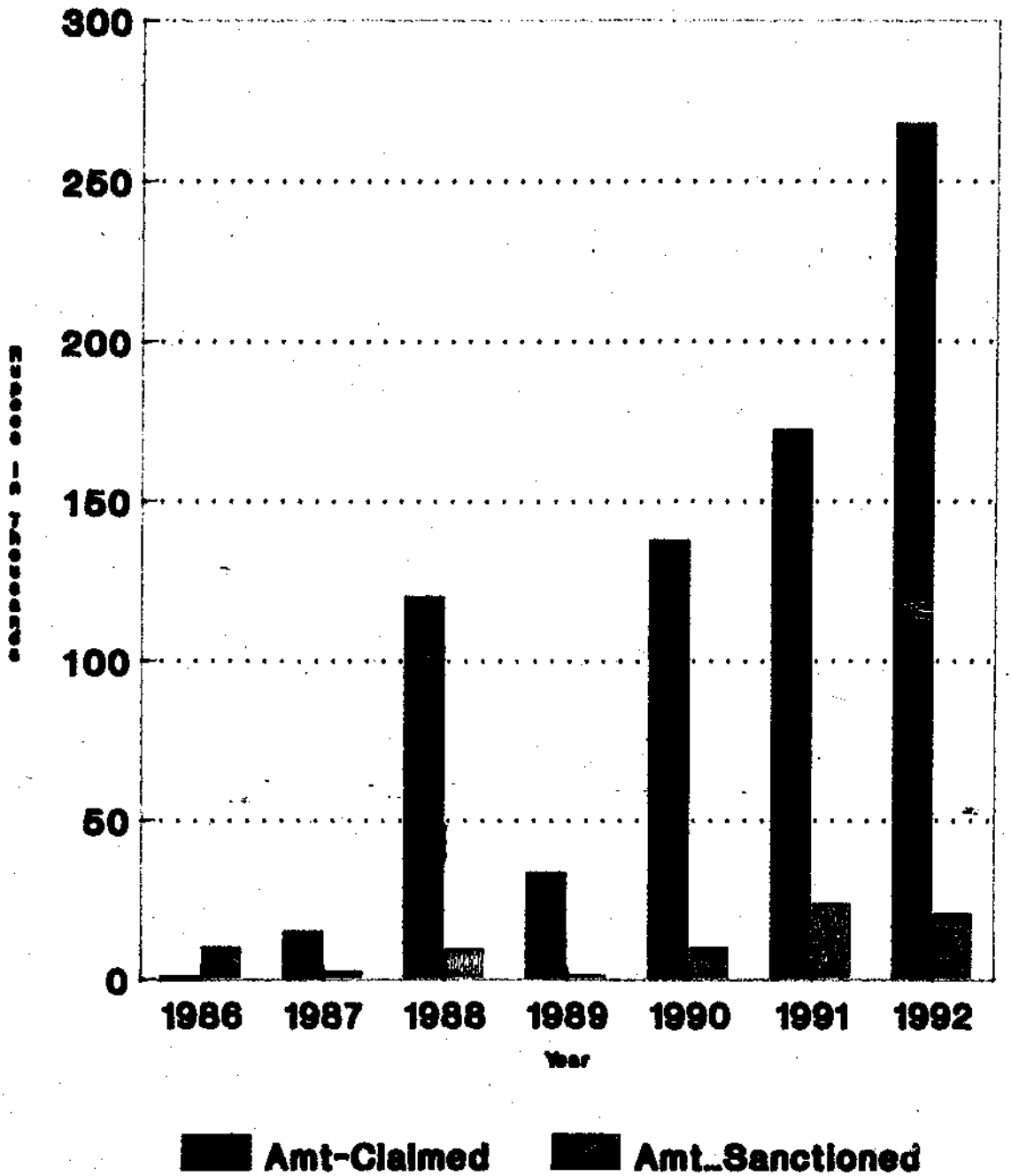
RECOMMENDATIONS

Man-Wildlife Conflict

Damages due to elephants have been comparatively few in the Reserve, though it is on the increase (Fig. 8). However, claims have been made for deaths

Fig. 8. Compensation Details

Meppadi Area



and also a few for crop damage. Considering the extent of area, bordering human habitations, it is not feasible to have protective measures all along the border or around enclosures. Hence, live-wire fencing is proposed around the tribal settlements in Agali Range.

Habitat Improvement Programmes

Considering the degradation of the habitat in different areas, enrichment of the habitat is suggested in Kalikavu, Edavanna, Vazhikkadavu, Mannarghat, Agali and Olavakkod Ranges. Fire protection measures have to be enhanced in all the Ranges in the Reserve. Water is a limiting factor atleast in Meppadi segment and part of Karulai and Kalikavu Ranges. Walayar, Olavakkode and Mannarghat Ranges also faces water scarcity during the dry season. Soil moisture may be conserved in all these through appropriate programmes.

Acquisition of land for Contiguity

The contiguity of habitat in the Reserve is lost between the Palghat Hills and Silent Valley-Nilambur segments. However, it is impossible to connect these through creation of corridor. Hence, the narrow strip of forests through Tamil Nadu become crucial for elephant migration in the area.

The erstwhile private forests of Nilambur Kovilakom and certain part of Anakkampoil in Thamarasseri Range have been vested with the Government. However, court verdict in favour of the owners poses serious threat to the conservation efforts in the region. The Nilambur-Kovilakom forests of about 467 Ha and about 100 Ha of forests in Thamarassery Range may be acquired to maintain the contiguity of forests in the region.

Eco-Development Programmes

The people in the Region, both tribals and non-tribals, depend on the forests to a great extent. A socio-economic survey among the tribals indicated that about 1050 households depend solely on forest for fuelwood, about 350 for fodder and about 300 for manure. This has been the major source of income for most of the people. Appropriate self-supporting eco-development programmes could be planned in all the areas. Dependance on forest for fire-wood could be reduced through solar and energy efficient cookers.

ELEPHANT RESERVE NO. 9

ANAMALAIS

The Reserve extends from south of Palghat gap upto Cardamom Hill Reserve including a number of Forest Reserves in Kerala and Indira Gandhi Wildlife Sanctuary of Tamil Nadu (Between 10°10' and 10°30'N. Lat. and between 76°33' to 77°8'E. Long.) (Fig. 9). This is the largest Reserve in Kerala consisting of a number of Protected Areas. The Forest Ranges under the administrative control of Nemmara, Parambikulam, Chalakkudy, Thrissur, Vazhachal, Malayattur, Mankulam, Munnar and part of Idukki Wildlife Divisions constitute the Elephant Reserve. The major Reserve Forests include the Nelliampathi, Kodasseri, Thekkadi, Malayattur, Anamudi, Kudakkad and Cardamom Hill Reserve. The details are given in Table 4. Parambikulam, Chimmoni, Peechi and Chinnar Wildlife Sanctuaries and Eravikulam National Park falls within this area (The area map is given in the Appendix). The total extent of this Reserve is about 2800 km^2 and includes a variety of habitats ranging from dry scrub jungle, tropical wet evergreen to grassland Shola system. About 440 km^2 of these have been planted with teak, eucalypts and *Albizia*. The reassumed lands of about 180km^2 in Mankulam, Silent Valley plateau and Tertian plateau, and the grassland - Shola forests interspersed with tea estates are frequently used by elephants. The reassumed lands and the estates connect Eravikulam National Park with Cardamom Hill Reserve. The Elephant Reserve is contiguous with Indira Gandhi Wildlife Sanctuary and Palni Hills of Tamil Nadu thus forming an Elephant Conservation Unit with almost contiguous habitat with a viable population.

The topographic variations, reflected in the rainfall and temperature, makes it possible to divide the Elephant Reserve into several distinct zones, the high rainfall areas of Pooyamkutty-Idamala Valleys (5000 mm), the Munnar region (2000-5000 mm), the Nelliampathis (1500-2000 mm) and the lowest rainfall areas (600-900 mm) of Chinnar and Marayur. The elevation varies from 40m to 2690 m. The variation in altitude, rainfall and temperature is reflected on the vegetation.

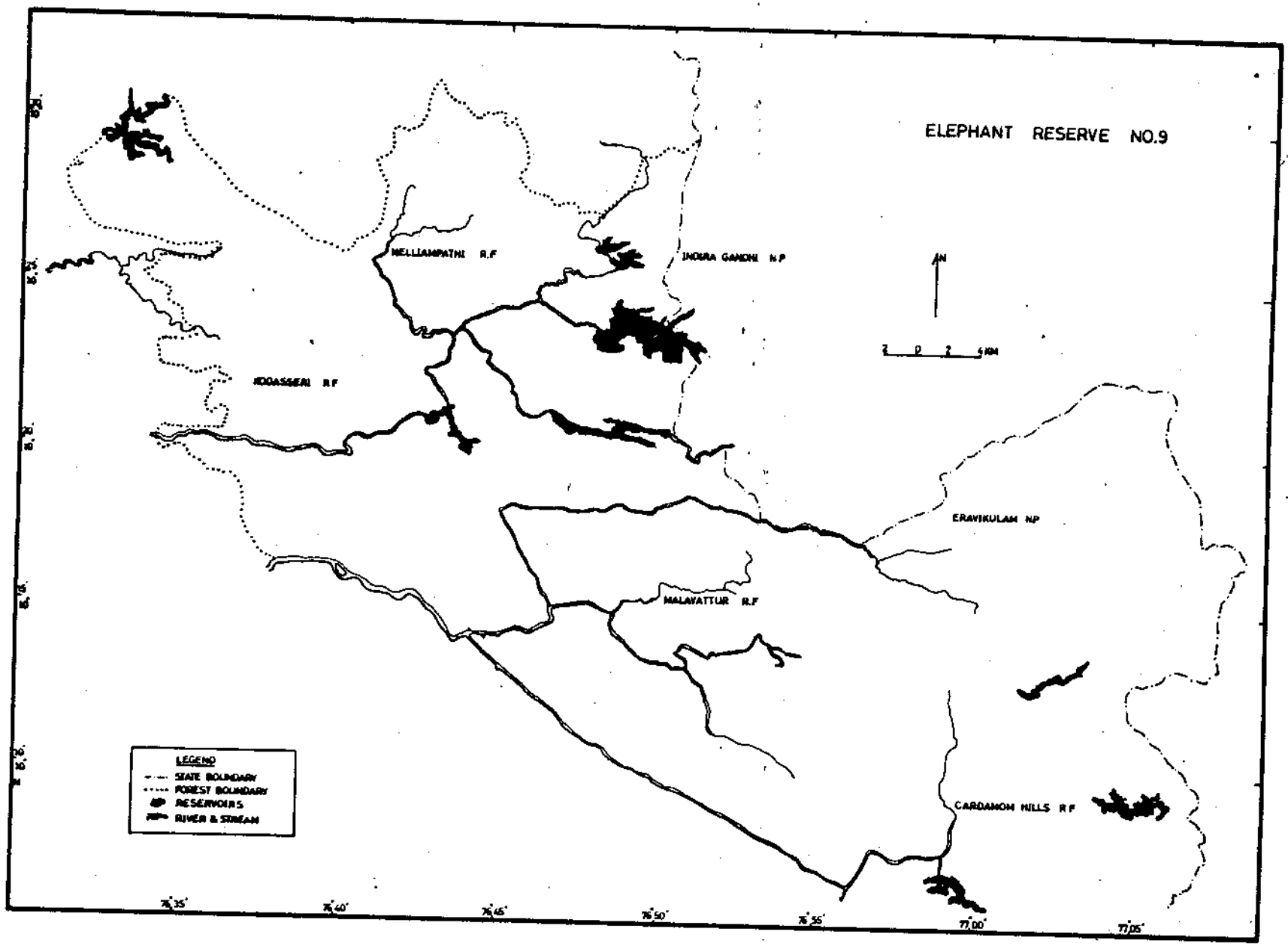

ELEPHANT RESERVE NO.9
NELLIAMPATHI R.F
INDIRA GANDHI N.P
KODASSERI R.F
ERAVIKULAM NP
MALAVATTUR R.F
CARDAMOM HILLS R.F
N
2 0 2 4 KM
LEGEND
STATE BOUNDARY
FOREST BOUNDARY
RESERVOIRS
RIVER & STREAM
76°35'
76°40'
76°45'
76°50'
76°55'
77°00'
77°05'

Table 4. Details of Major Reserve Forests in Elephant Reserve No. 9

Sl. No.	Name of R.F.	Area (km^2)	Sl. No.	Name of R.F.	Area (km^2)
1.	Cardamom Hill Reserve	479.25	11.	Anamudi	106.19
2.	Kodasserykunnu	4.5	12.	Kudakkadu	20.00
3.	Kodasserykoomba	11.05	13.	Thecodathumala	4.87
4.	Bharathamala	4.29	14.	Athirappally	235.12
5.	Kodessery U.S.R.F.	326.42	15.	Paravattani Hills	131.48
6.	Malayattur	194.21	16.	Nelliampathy	404.42
7.	Thattekkad	4.18	17.	Thekkady	69.77
8.	Neriyamangalam	21.39	18.	Ailamudy	6.43
9.	Arakulam	15.68	19.	Aathanad	2.24
10.	Chinnar	90.44	20.	Chinnagovinda mala	9.96

Nelliampathis

Nelliampathis is the northern most part of the Reserve and includes the areas under Parambikulam, Chalakkudy, Vazhachal and Thrissur Forest Divisions. The north eastern slope of Nelliampathis is drained by a number of seasonal streams forming Chulliar, a tributary of Gayathripuzha. The north western portion is drained by Ayalurpuzha and Cherukunnu puzha, both tributaries of Gayathripuzha. The tributaries of Kurumalipuzha and Chimmoni-Mupli rivers drain the western slope. The Parambikulam and Chalakkudy areas are drained by a number of streams joining together to form Chalakkudy river.

The Parambikulam areas of Nelliampathis have been subjected to extensive forestry operations converting most of the teak bearing moist deciduous forests into teak plantation. However, remnants of moist deciduous forests are still seen scattered in the flat areas and are interspersed with 'vayals' or marshy areas. The evergreen forests are confined to the higher ridges. The deciduous forests and the plantation areas have very good regeneration of bamboos. A good extent of the vayals are now bamboo areas. The higher reaches of Nelliampathy Forest Range bordering Parambikulam Wildlife Sanctuary have been leased out and converted into plantations of tea, coffee, pepper and cardamom. Parambikulam Wildlife Sanctuary and adjoining areas of Kollengode Forest Range continue to support a good number of animals.

Areas under Parambikulam Wildlife Sanctuary have been protected from fire for the last few years. However, the changes in the undergrowth after prolonged protection of the area from fire seems to have promoted the luxuriant growth of weeds such as *Lantana* and *Eupatorium* suppressing the natural growth of grasses and shrubs. The 'vayals' are maintained through weeding and controlled burning.

There are three reservoirs of Parambikulam Aliyar Projects in Parambikulam Wildlife Sanctuary. However, the streams - Thunakadavu, Veeti Ar and Thekkadi Ar dry up in summer leading to acute scarcity of water in most of the areas. Studies on elephant movement have shown that water availability plays an important role in the movement of elephants in the sanctuary. Aggregations of herds concentrating in water available areas lead to degradation of the surrounding habitats.

The Chimmoni Wildlife Sanctuary and adjoining areas of Vellikulangara Forest Ranges include well preserved patch of moist deciduous and evergreen forests. About 60 km^2 of forest areas in Chalakkudy Division is under plantation. A sizable area of Chimmoni Wildlife Sanctuary has been submerged for the reservoir. The areas have been subjected to frequent fire and is the most important cause of degradation both in Chimmoni Wildlife Sanctuary and adjoining Forest Ranges of Chalakkudi Division.

Peechi-Vazhani Wildlife Sanctuary is the north-western portion of the Elephant Reserve. Existing as two bits with no contiguity, only Peechi portion of the sanctuary falls under the Reserve. Major vegetation types include evergreen, semi-evergreen and moist deciduous forests and plantations. This is the most degraded area in the whole of the Elephant Reserve. Fire is an annual phenomenon devastating a good extent of the area. Cattle grazing, fire wood collection and other factors also act on the area as a result of which the elephants which have been reported to visit the Reservoir fringes earlier make only seasonal visit to the south-eastern areas bordering Chimmoni Wildlife Sanctuary.

The forests of Vazhachal Division consists of tropical wet evergreen, semi-evergreen and moist deciduous forests. Most of the evergreen patches are confined to the Sholayar and Kollathirumedu Ranges. Large scale conversion of natural forests have taken place in the Division. About 70 km^2 have been planted with eucalypts, teak, *Albizia*, etc. The plantations adjoining Orukomban Range of

Parambikulam Wildlife Sanctuary have been a failure and these are highly degraded areas at present. A large patch of evergreen forests in Vazhachal Range was subjected to manipulations and coupled with frequent fire degraded the area and looks barren covered with the notorious weed, *Michaenia*. The extent of *Michaenia* infested area in the Division is approximately 40 km^2. *Michaenia* has covered both degraded and untouched forests. Plantation activities and collection of reeds are the major disturbances to the system.

The Pooyamkutty-Idamala Valley

This valley is in continuation with the Vazhachal and Anamudi areas. The Idamala valley is only at 100m elevation and the ridges on either side reach an elevation of about 1400m. The area is drained by Idamala river and its tributaries. The Pooyamkutty, on the south of Idamala, is drained by Pooyamkutty Ar and its tributaries.

These areas have been well known for the semi-evergreen forest with extensive reed patches. The evergreen forests and the grassland - shola system in the higher elevations and moist deciduous forests and reed patches in the lower areas make the valley a much more complex ecosystem than other parts of the Reserve. An area of about 48km^2 is submerged by the reservoir of the Idamala hydro-electric project and the irrigation barrage of Boothanthankettu submerged the vegetation of Periyar river bank.

The vast expanse of forests in this tract have been exploited for industrial purpose. Reed collection is a year round phenomenon. The disturbance due to people and the unscientific year round exploitation of reeds have opened up most of the areas resulting in degradation. *Michaenia* has established itself in most of the areas threatening the system. The agricultural practices by Muduvan settlements in the resettled areas have resulted in degradation of surrounding areas mainly due to soil erosion. A major part of Malayattur Forest Division is under teak raised as Industrial Plantations. The higher reaches bordering Eravikulam National Park is under Wattle Plantation. However, the area with diverse vegetation holds one of the best forests with high biological diversity.

The Chinnar-Marayoor Areas

This is the east sloping part of the Elephant Reserve with rain shadow areas. The region is drained by Pambar and Chinnar. The elevation ranges from 400m to 2000m forming valleys and cliffs. The slope towards east and the topography contributed to the diversification of vegetation with dry scrub thorny forests in the lower areas and grassland shola system in the higher elevations. A number of shola patches occur scattered in the area. The forests of Chinnar are extremely degraded due to fire and cattle grazing.

Cardamom Hills

The Cardamom Hills in the Elephant Reserve extends from the bordering areas of Kannan Devan Estate upto Santhampara and includes the Anayirangal area and Methikettan Shola. The area falls under the administrative control of Devikulam Range of Munnar Forest Division. Most of these areas have been planted with eucalypts. The natural forests of evergreen type are highly fragmented due to cardamom and tea estates and Anayirangal reservoir. A number of shola forests occur in patches in the eastern part bordering Tamil Nadu, the largest one being Methikettan. This part of the Reserve has been the migratory route of elephants from Palni Hills through Mattupetti and Anayirangal. Recent encroachments in Methikettan Shola and illicit felling of trees have disturbed the area. The legal complications involving the Forest Department and the Revenue Department seems to be the major impediment in protecting the area.

The Elephant Population

The continuous stretch of forests with varied type of vegetation and comparatively less human habitations make this Reserve ideal as a Conservation Unit for elephants. The recent census has estimated a density of 0.68 elephants/km^2. An assessment of population indicate that Parambikulam Wildlife Sanctuary and forests of Vazhachal Division have been utilized to a great extent by elephants. Density of elephants in Malayattur and Munnar Forest Divisions and Chinnar Wildlife Sanctuary were comparatively low. The overall male-female sex ratio for the region is 1:9.

Other Wildlife in the Reserve

This is one of the major bio-diversity hot spots in the Western Ghats. The diversity of habitats is reflected in the diversity of animal species. In addition to the common larger mammals found in other Reserves, the high elevation grass-land shola forests abode the highest number of endemic and endangered Nilgiri tahr. Further, the forests of Chalakkudi, Vazhachal and Parambikulam are the only known range of Cane turtle and Travancore tortoise in Kerala. The riverine vegetation in Chinnar Wildlife Sanctuary has the Grizzled giant squirrel.

The Human Habitations

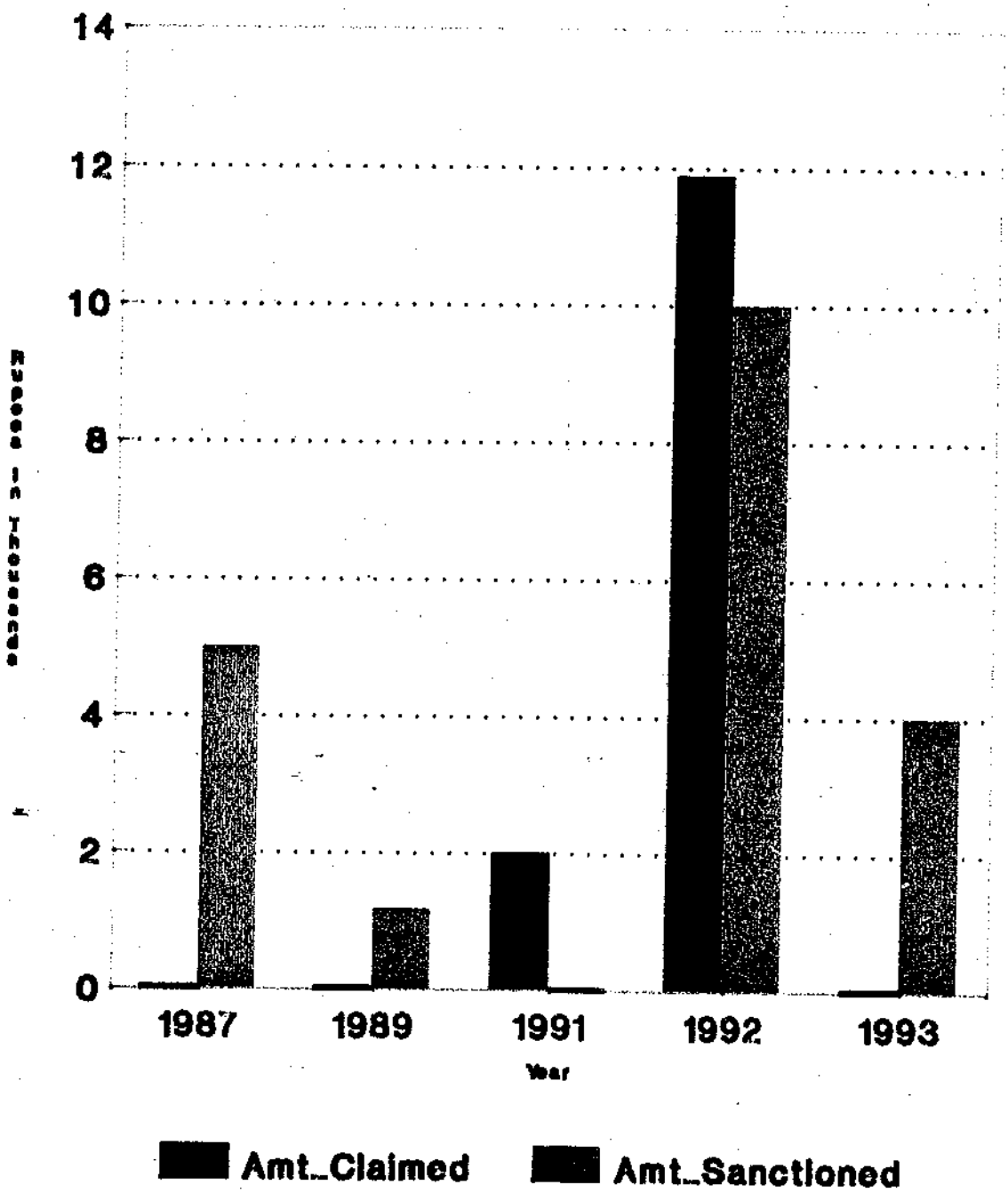
There are about 88 tribal settlements in the area, a majority of which are in Munnar Range. However, only a few of them are within the Reserve. Others are either on the fringes or outside the forested areas though areas fall under the administrative control of the Forest Department. Muduvans are the major tribal community and they are followed by Kadars, Malapulayars and Malasars. The non-tribal settlements are mostly confined to Churulipatti (Chinnar Wildlife Sanctuary), Anakkulam-Mankulam areas (reassumed lands) and the Kallelimedu (Reserved Forests). Analysis of the survey on tribal communities show that about 1734 house holds depend exclusively on forest for fuel wood. About 435 house holds depend completely on forest for fodder and about 281 house holds for manure. A majority of these tribals keep cattles though the products are not utilized by them. The cattles owned by the non- tribal villagers in the adjoining areas are given to the tribals, for a meagre amount, for grazing in the forests. The goats reared by Muduvans are mainly used for meat. Tribal Welfare Department, as a welfare measure, supply them goats and ultimately become a source of disturbance to the surrounding forests.

Man-Wildlife Conflict

Reports of Man-Wildlife conflict from the area are comparatively few. Though, with higher density of elephants, the vast stretch of comparatively undisturbed forests, and agricultural practices of the dominating tribal communities might have contributed to the lower number of crop damage or man killing by elephants reported from the area. However, damage claims are on the increase (Fig. 10). An amount

Fig. 10. Compensation Details

Anamalai Region



of Rs. 22,000/- have been paid as compensation for crop damage in Parambikulam, Chalakkudy and Vazhachal Forest Divisions during the year 1987-1993. However, the tribals in some of the areas have complained that lack of protection from elephants force them not to cultivate in their settlements.

MANAGEMENT PROBLEMS

Habitat degradation

Habitat degradation due to conversion of natural forests to monoculture plantations, fire and weeds is the most important management problem in the area. The degradation leads to water and fodder scarcity.

Protection of animals

This is one of the most vulnerable areas requiring strict protection measures. A number of elephant poaching cases have been reported in the recent past (Fig. 16).

Maintaining Contiguity

A number of settlements within the Reserve disrupt the contiguity of forests and free movement of animals.

RECOMMENDATIONS

Establishment of corridors and rehabilitation of enclosures

The tribals in the Reserve live in harmony with nature without causing severe damage to the forest. Priority in the region should be given to acquisition of land owned by the non-tribals. Churulipatti in Chinnar Wildlife Sanctuary is in the border with Indira Gandhi Wildlife Sanctuary of Tamil Nadu. The people in the enclosure have expressed their willingness to handover the land which is about 32 ha in extent. Acquisition of this enclosure would establish a contiguous patch of undisturbed area in the border. However, rehabilitation of the Kodanthurkudi tribal settlements in Tamil Nadu also should be taken up immediately as these tribals are reported to give refuge to non-tribals with bad motives. The Njavala settlements on the fringes of Chinnar Wildlife Sanctuary should also be acquired. The total extent would be about

50 ha. Though the tribals in the area are very co- operative with the sanctuary authorities in protection of wildlife, their rehabilitation to a suitable area in the fringes (eg. the acquired land in Njavala) would help in removing all sources of disturbance and dependence on the forests from the area.

The non-tribal encroachers on the east of the Elephant Reserve in Anakkulam-Mankulam area is a major source of disturbance to the ecosystem. Degradation of the forests and disturbance to the free movement of elephants are evident. Acquisition of these areas may be thought of at a later stage.

Habitat Restoration

The forests in different parts of the Elephant Reserve has been subjected to various forestry practices. Large scale conversion of natural forests into plantations, exploitation of reeds and bamboos for industrial purposes coupled with occurrence of fire contributed to the degradation of the habitat. The habitats in Parambikulam and Chinnar Wildlife Sanctuaries, Kollengode Range of Nemmara Division, forests of Chalakkudy and Vazhachal Divisions experience severe drought during summer season.

Weeds such as *Lantana* and *Eupatorium* have taken over a major part of the forest undergrowth in this region. Further, *Michaenia* has become a menace in Vazhachal and Malayattur Divisions. Eradication of weeds have to be given top priority in all these areas. Considering the severe scarcity of water in almost all the Ranges, water sources may be created in appropriate places and the existing one may be maintained through desiltation. This would ensure uniform distribution of animals reducing pressure on areas with water and food availability leading to degradation of the surrounding habitat. Removal of vegetation and plantation activities have lead to soil erosion in Charpa, Kollathirumedu, Sholayar and Vazhachal Ranges of Vazhachal Division, all the Ranges of Parambikulam Wildlife Division, Chimmoni and Vellikulangara Ranges of Chalakkudy Forest Division. Suitable measures have to be taken up to prevent further erosion in these areas. Enrichment of the habitat with suitable species would help in the control of soil erosion and weed growth in the long run.

The Forest Ranges in Malayattur Forest Division, especially Thundathil and Kuttampuzha are the major source of reeds for the industry in the State. The reeds also form a major part of food of elephants. Strict vigilance may be maintained to adhere to the prescriptions of extraction and also the closed season.

The semi-evergreen and evergreen patches in the Reserve are threatened by *Michaenia*. Urgent measures have to be taken up to control the spread of this killer weed to more areas. Studies may be conducted to find suitable, nature friendly method of eradication of the weed. The drier areas are severely affected due to frequent fire and cattle grazing. Further, the pressure on the forests from the settlements and adjoining villages for fire wood and fodder is immense. The cattle population in the settlements and enclosures within the Reserve have to be brought down. Grazing areas may be earmarked, fenced and fodder grasses planted at least in Chinnar and Marayur areas urgently. Lemon grass cultivation and distillation for oil is practised in most of the tribal settlements in High Ranges. The fire wood requirements for distillation are met from the surrounding forests. The practice has to be discouraged. The fire wood requirement for other purposes should be met from the fuel wood plantations raised in the settlements involving the residents for maintenance. The non-conventional energy sources could also be made available to the people for various purposes.

Eco-development Programmes

Preliminary survey among the tribals indicate their dependence on various forest resources for livelihood contributing to the degradation of the habitat. Habitat improvement programmes alone would not help unless the factors of degradation are removed from the system. Hence, it is important that various programmes are implemented for the welfare of the people, especially the tribals to reduce pressure on forests.

The tribals are presently engaged in cattle grazing, lemon grass cultivation and distillation, and fire wood collection. Since most of these cattles are not their own, they should be asked to reduce the number depending on their requirement. Further, grazing areas should be earmarked and fenced. Lemon grass cultivation should be discouraged. They may be encouraged to take up alternate ways of income generation such as poultry, bee keeping, etc. Fuel wood plantation may be raised within the settlements with the involvement of the people and maintenance should be left to them. Alternate energy sources also may be provided.

These programmes have relevance especially in Chinnar, Marayur and Munnar areas.

ELEPHANT RESERVE NO:9A

IDUKKI REGION

This Elephant Reserve comprises Idukki Wildlife Sanctuary, Nagarampara and Ayyappankoil Ranges of Kottayam Forest Division, Thodupuzha and Kaliyar Ranges of Kothamangalam Division and Neriamangalam Range of Munnar Division. The contiguity of this region with adjoining forest areas has been lost due to encroachments and developmental programmes. Thus, Idukki has been cut off from other forests of Western Ghats forming the smallest patch of forest in the state (Between 9° 42' and 9° 50' N. Lat. and between 76° 51' and 77° 59' E. Long.) (Fig. 11). This patch is further fragmented on the northern side separating the Lower Periyar area of Neriamangalam Range (Area and habitation maps are given in the Appendix). The major Reserves include Nagarampara and Thodupuzha (Table 5). The road from Chelachuvadu to Thodupuzha through Venmani area and the settlements all along make it impossible for the animals to move between the areas. The same road has separated the Kaliar Range from the adjoining forests of Nagarampara and Thodupuzha Ranges to a great extent leaving only a narrow strip. The area is highly undulating and the elevation ranges from 400 M to 800 M. The average precipitation is about 2000 mm. Temperature varies from 15^{0}C to 29^{0}C. A major part of the area is drained by Periyar and tributaries.

The Habitat

The natural forests of evergreen and semi-evergreen types are confined to certain pockets, the largest ones being in the Meenmutti and Vagavanam area. The grasslands and the savannas form the rest of the forest areas. The entire stretch of grasslands and the savanna are highly degraded due to fire and certain areas look barren. The grasslands, both within and outside Protected Areas have been recently planted with *Acacia auriculiformes, Grewelia robusta* and a number of other species.

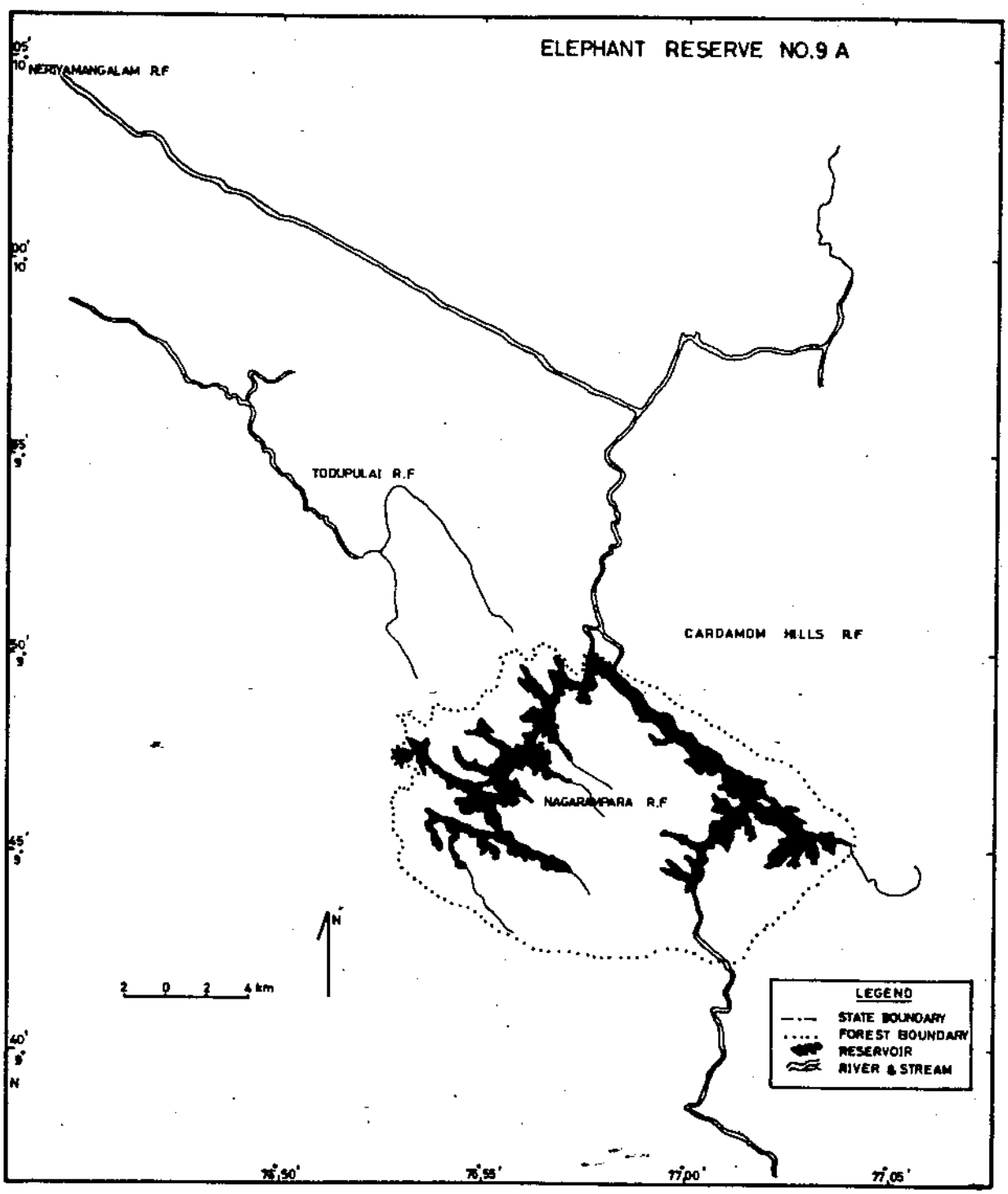

ELEPHANT RESERVE NO.9 A
NERIYAMANGALAM R.F
TODUPULAI R.F
CARDAMOM HILLS R.F
NAGARAMPARA R.F
10° 05'
10° 00'
9° 55'
9° 50'
9° 45'
9° 40' N
76° 50'
76° 55'
77° 00'
77° 05'
N
2 0 2 4 km
LEGEND
STATE BOUNDARY
FOREST BOUNDARY
RESERVOIR
RIVER & STREAM

Table 5. Details of Reserve Forests in Elephant Reserve No. 9A

Sl. No.	Name of R.F.	Area (km^2)
1.	Nagarampara	313.39
2.	Thodupuzha	256.94

Elephant population

The density of elephants in the region is estimated to be 0.48/km^2. Studies in the area have shown that the sex ratio is highly skewed (1:20) and the population structure indicates an unhealthy trend. The discontiguity of habitat has lead to isolation of a herd of about 15 elephants in the Lower Periyar area of Neriamangalam Range. The vehicular traffic along the Idukki- Thodupuzha road and plantation activities in different parts of the region forces the herds to confine themselves to undisturbed evergreen patches most of the time.

Other Wildlife in the Reserve

The fragmentation and degradation of the habitat due to developmental programmes, encroachments and other human activities affected the fauna adversely. The gaur became locally extinct. The sambar deer, barking deer and mouse deer occur in very few numbers. Wild boar is probably the only successful survivor of all these activities. The larger predators have almost vanished from the area.

Man- Wildlife Conflict

There are a number of settlements of both tribals and non-tribals within and surrounding areas. Most of these areas have been under cultivation. The major crops include coconut, Arecanut, tapioca, plantain, rubber, cardamom, coffee and pepper. The type of crops cultivated and the agricultural practices often attract wildlife leading to crop- damage. Further, the settlements depend on the surrounding forest areas for fire wood, fodder and thatching materials. Cattle grazing lead to further degradation of the habitat. Crop damage incidences are so severe in certain areas that the people have come forward to offer their lands for take over by Government.

MANAGEMENT PROBLEMS

Habitat degradation

Habitat is highly degraded due to fire, over-exploitation of forests and soil erosion.

Isolated population

A herd of elephants has been isolated in a pocket of forests.

Acquisition of land

Though it is not possible to establish contiguity with adjacent forest areas, a number of enclosures of willing people could be acquired.

RECOMMENDATIONS

Habitat Improvement

Habitat enrichment programmes have to be taken up to ensure year round food availability in all the areas. Grazing of about 2,500 cattles owned by settlements have been the major degradative factor. In addition, the fire damaged areas have become almost barren. These areas have to be enriched through soil and moisture conservation programmes. Fire protection measures have to be taken to prevent fire incidents. Most of the areas have the weeds *Michaenia* and *Lantana*. These have to be controlled.

Acquisition of land

Acquisition of lands of the people who are willing to move out would reduce the pressure on the habitat. The nine families occupying about 30 acres of lands surrounded by the forests of Nagarampara and Thodupuzha Ranges and Kerala Forest Development Corporation Cardamom Projects, in Nootiyappan Colony-South of Palkulam Medu have given their consent to move out of the area. Crop damages by elephants, wildboar, porcupine and other wildlife have been severe in these areas.

Shifting of settlements in the Southern portion of the Idukki Wildlife Sanctuary (Kannampadi, Memari, etc.) could also be thought of.

Management of Isolated population

The Lower Periyar area has been completely cut off from the continuous patch of forests in the Idukki region. Experiences in Karnataka shows that translocation of the elephants trapped in the region would not be a permanent solution. Hence, it is suggested that these could be caught by immobilisation or trapping and could be used as a breeding stock to meet the domestic requirements. Studies may also be conducted prior and after the capture operation to assess the impact of elephants on the vegetation.

Eco-development Programmes

There are about 23 tribal settlements within Idukki Wildlife Sanctuary, Nagarampara and Ayyappankovil Ranges. About 868 house holds are depending on the forest alone for their fire wood requirement. Further, 610 and 201 house holds depend on the surrounding forests for fodder and manure respectively. The pressure on the forests have lead to degradation of habitat. Eco-development programmes intended to reduce the dependence on forests have to be implemented. Bee Keeping could be encouraged as a source of extra income. Fuel wood plantations may be raised around the settlements and in the adjoining villages of non- tribals. Solar cookers may be supplied atleast to the non-tribals at a subsidised rate. The number of cattles may be reduced to one or two per family and grazing areas may be earmarked and fenced. Poultry may be encouraged among the tribals.

ELEPHANT RESERVE No. 10

PERIYAR AND ADJACENT AREAS

The vast stretch of forests extending from north of Aryankavu pass to Periyar Tiger Reserve form the Elephant Reserve. This includes the Reserve Forests of Achenkoil, Konni, Ranni, Gudrickal, Kumaramperur, Mount Plateau and Periyar Lake (Table 6). The area falls under the administrative control of Achenkoil, Konni, Ranni, Periyar Tiger Reserve and Erumeli Range of Kottayam Forest Division (Between 8°56' and 90°34'N. Lat. and between 76°52' and 77°25'E. Long.) (Fig. 12). The total extent of the Reserve is about 2400 Km^2 and is contiguous with Varashunad Hills of Tamil Nadu. About one third of the areas constitutes Periyar Tiger Reserve (Please see the maps in Appendix). The major vegetation types include tropical wet evergreen forests followed by deciduous forests. About 170 Km^2 have been planted with teak, eucalypts, etc.

Average rainfall in the Reserve ranges from 3000 to 5000 mm and temperature varies from 13°C to 29°C. The terrain is highly undulating with valleys and hills. The tributaries of Pamba and Periyar drain the area.

In spite of large scale planting of most of the moist deciduous forests and encroachments in the lower regions, the Reserve has a vast expanse of tropical wet evergreen forest. Most of the evergreen forests are confined to Periyar Tiger Reserve and Goodrickal Range of Ranni Forest Division. Patches of evergreen are found in Kallar, Vadasserikkara and Achenkoil Ranges. Extensive reed areas are located in Goodrickal, Kallar and Vadasserikkara Ranges. These have been regularly exploited for industrial purpose. However, intact areas still remain on the eastern part of these Reserve bordering Tamil Nadu. The deciduous forests are mainly in Achenkoil, Konni, Ranni and Erumeli Ranges. A large portion of these have been converted into plantations. The Reserve has a number of reservoirs.

The forests are more or less contiguous with a few enclosures, settlements and estates in Vallakkadavu, Mannarappara, Naduvathumuzhi, Vadasserikkara and Goodrickal Ranges.

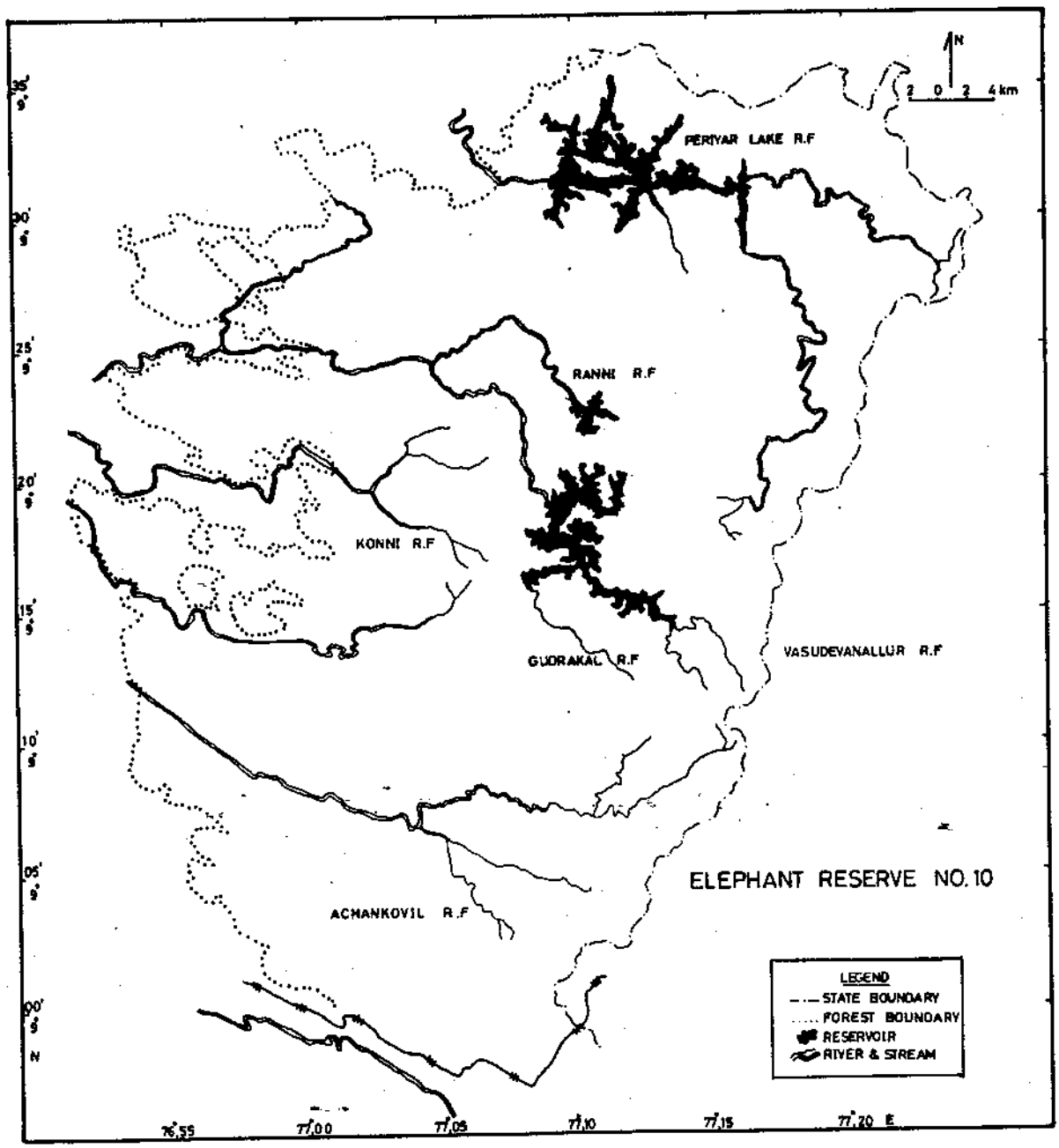

N
2 0 2 4 km
PERIYAR LAKE R.F
RANNI R.F
KONNI R.F
GUDRAKAL R.F
VASUDEVANALLUR R.F
ACHANKOVIL R.F
ELEPHANT RESERVE NO. 10
LEGEND
STATE BOUNDARY
FOREST BOUNDARY
RESERVOIR
RIVER & STREAM
9° 35'
9° 30'
9° 25'
9° 20'
9° 15'
9° 10'
9° 05'
9° 00' N
76°55
77°00
77°05
77°10
77°15
77°20 E

Table 6. Details of Reserve Forests in Elephant Reserve No. 10

Sl. No.	Name of R.F.	Area (km^2)
1.	Achenkoil	420.24
2.	Konni	923.32
3.	Residual Konni Reserve	489.51
4.	Ranni	302.23
5.	Goodrickal	502.46
6.	Rajampara	10.36
7.	Karikulam	7.77
8.	Vadagiri	2064.00
9.	Karikathur	10.08
10.	Urumbikara	8.05
11.	Kumaramperur	87.01
12.	Periyar Lake	600.88
13.	Mount Plateau	163.17

A part of the area is highly degraded due to human activities and fire. The reed extraction activities are the major source of disturbance in Goodrickal and Vadasserikkara Ranges. A major portion of the evergreen forests are infested with the weed, *Micheenia*. The habitat is highly degraded in Achenkoil Range due to plantation activities and frequent fire. Sabarimala area of Vallakkadavu Range is degraded due to pressure from the pilgrims.

Elephant Population

Density of elephants in the Reserve was estimated to be 0.61/Km^2. Periyar Tiger Reserve had the highest density followed by Ranni, Kallar, Goodrickal, Mannarappara and Vadasserikkara Ranges. The overall sex ratio was found to be 1:3.

Other Wildlife in the Reserve

Vast stretch of almost undisturbed forest and occurrence of a good number of diverse fauna make this area one of the richest habitat in the Western Ghats. The Reserve holds the highest population of tiger and also a variety of herbivores including Gaur, Sambar deer, Barking deer, Mouse deer, and Wild boar. All the primate species including loris have been reported from the area.

Human habitations

The fewer number of enclosures and settlements in the Reserve make it an ideal habitat for the elephant. About 520 acres of private estate at Pachakanam and the 1.5 acres of land occupied by 13 families at Kochu Pamba are the major settlements in the northern part. Pachakanam estate, formerly owned by a single owner, is presently under different management. There has been changes in the cultivated crop from cardamom to a mixed type. Presence of this estate right inside the Reserve is a perpetual problem requiring immediate attention. A number of workers are also staying in the Kerala Forest Development Corporation estate in Gavi. A number of smaller settlements are found towards South.

MANAGEMENT PROBLEMS

Habitat degradation

A major portion of the Reserve, especially Achenkovil, Ranni and Konni areas, is highly degraded due to fire, extraction of natural resources, weeds and dependeance on forest by the people.

Protection of animals

The contiguity of the area with adjoining forests of Tamil Nadu make the Reserve vulnerable to illicit wood cutters and poachers.

Contiguity of habitat

A number of larger and smaller enclosures within the Reserve is a threat to long term conservation.

RECOMMENDATIONS

Acquisition/Rehabilitation

The contiguity of the area can be maintained and the major causative factors of disturbance avoided through the acquisition of the estate and rehabilitation of a few settlements as listed below.

1. About 523 acres of Pachakanam estate may be acquired.

2. The 1.5 acres occupied by 13 families at Kochu Pamba may be taken over. They can be rehabilitated in the one hectare plot available near habitation in Goodrickal Range itself.

3. The Malampandaram tribals occupying about 1.5 ha of land at Cheppankuzhy near Gurunathan Mannu may be acquired.

4. The Kodampupara settlements in Mannarapara Range, occupying about 400 acres could be taken over. The major crops of this non-tribal settlements are rubber, tapioca and plantain.

5. About 75 acres of land in Chempanaruvi in Mannarappara Range is with the non-tribals. This area may be acquired.

6. Twenty acres of land is given to non-tribals at Uliyanad for medicinal plants cultivation. Rubber is also planted in the land. The lease of this land in Naduvathumuzhi Range may be reconsidered.

7. About 2,000 acres of land in Appuppanthodu in Naduvathumuzhi Range is occupied by non-tribes. These may be acquired.

8. The non-tribal population have brought about 1,500 acres of land under cultivation in Kottampara (Neeramkulam).

In addition to the above, developmental programmes in the area have also blocked free movement of elephants. Widening of the road from Ranni to Pamba with steep slope on the one side and cutting on the other have almost impeded crossing of the road which cut across forest. The concerned authorities have to be approached for leaving more slope in several places to facilitate easy movement.

Tamil Nadu Forest Department has taken up trench work in High Wavy's bordering Periyar. This tract is presently used by elephants for movement from Periyar Tiger Reserve to Meghamala areas.

Further construction or improvement of existing roads will fragment the habitats especially due to the possibility of heavy traffic during Sabarimala pilgrimage season. All developmental programmes in the Reserve should be co-ordinated by the Wildlife Wing of the Forest Department to avoid fragmentation and disturbance to the habitat.

Elephant death has been reported in Periyar Tiger Reserve due to electrocution. The power line from Thekkadi to Edappalayam lake palace should be replaced with underground cables.

Habitat Improvement

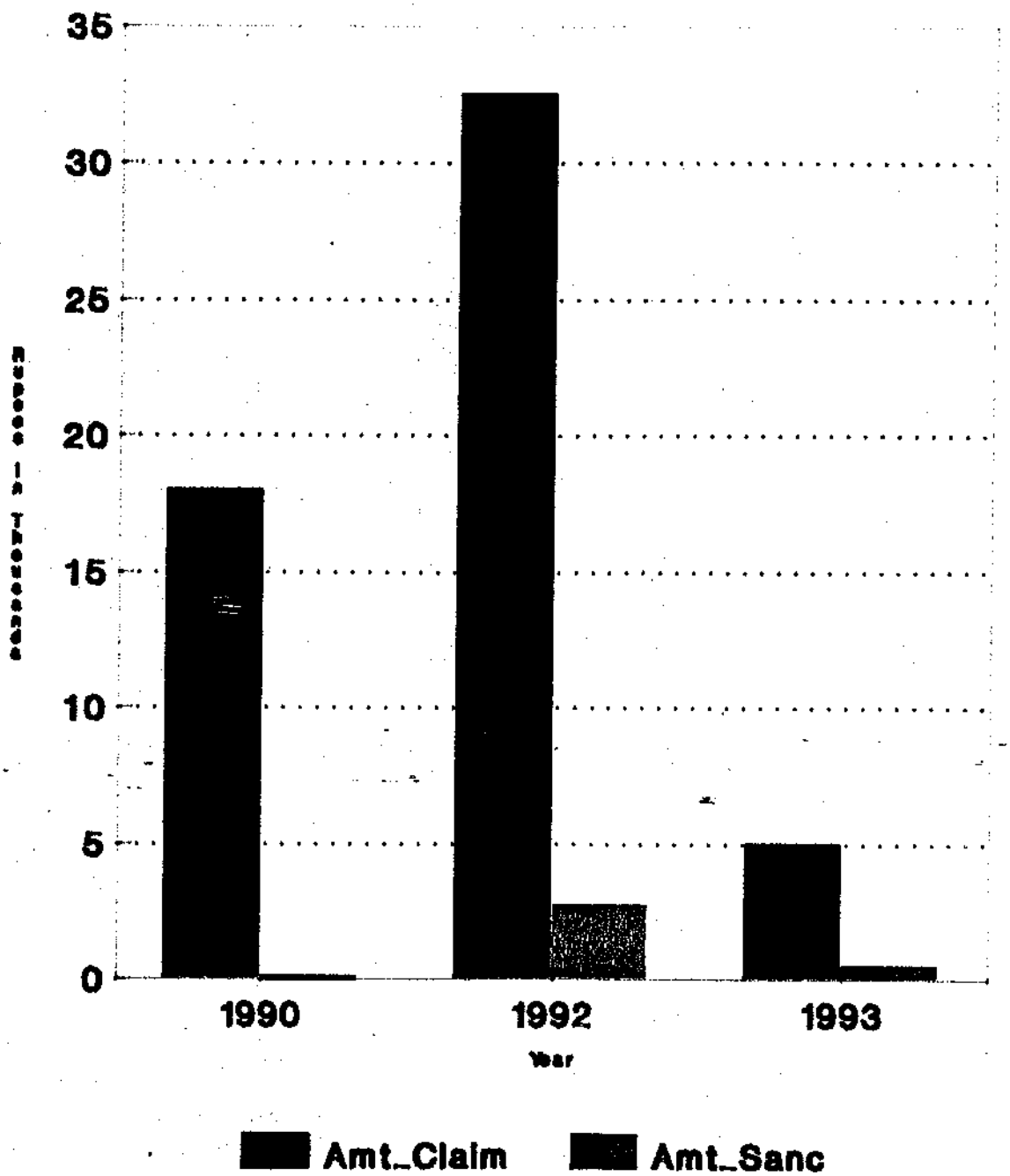
The degraded habitat of Achenkoil, Konni and Ranni Forest Division requires enrichment through planting and soil moisture conservation measures. *Michaenia* has spread over an area of about 40 Km^2 in Goodrickal Range alone. Immediate measures have to be taken to eradicate the weed and control further spread. Fire is the most damaging factor in all the Ranges. Fire control measures have to be stepped up in all the Ranges, especially in the southern part of the Reserve. Uncontrolled fire leading to removal of vegetation has resulted in serious soil erosion problems in most of the areas in the Reserve. Control measures have to be taken to protect the soil. Grazing blocks may be earmarked especially in Ranni, Vadasserikkara, Konni, Naduvathumuzhi and Mannarappara Ranges to avoid grazing pressure on the habitat.

Man-wildlife conflict

Incidences of crop damage by elephants have been very few in the areas falling under the Reserve. However, the claims have increased from Rs. 18,000/- in 1990 to 32,500/- in 1992 (Fig. 13). Most of these have been from the southern part of the Reserve. Instances have also been reported in some places like Vallakkadavu Ranges where people have not even reported incidences of crop damage due to ignorance of the provision. The payment of compensation have to be continued till the problematic settlements have been rehabilitated and the habitat conditions improved.

Fig. 13. Compensation Details

Periyar-Ranni Region



Eco-development programmes

An analyses of the socio-economic survey of the tribal people in the area indicate that about 950 people depend on forests for firewood, 50 for manure and 325 for fodder. The impact on the forests, especially in the areas adjoining villages is very high. These pressures could be reduced only through creation of alternate income generation facilities. Appropriate programmes suitable for different parts of the Reserve should be planned for employment and income generation. These programmes should be planned in such a way that they would become a self supporting system in the long run.

ELEPHANT RESERVE NO:10A

AGASTHYAMALA

This elephant Reserve extends from South of Aryankavu pass to the forest areas in Neyyar Wildlife sanctuary and is contiguous with Mundanthurai- Kallakkadu forests of Tamil Nadu (Between 8° 30' and 9° 0'N. Lat. and between 76° 57' and 77° 13' E Long. (Fig.14). The area is better known as Ashambu hills. This include the Kalamala, Kottoor, Yeroor, Palode, Kulathupuzha and Aryankavu Reserve forests (Table 7). The total extent of the Elephant Reserve would be about 650 km^2. The forests of Trivandrum Wildlife Division and the Shendurney and Thenmala Ranges of Thenmala division falls in the Reserve. Protected Areas constitute about 280 km^2 of the Reserve (Please refer maps in the Appendix).

The Reserve is of hills with undulating terrain. Most of the areas are at an elevation of about 1000 M and the highest peak is the Agasthyamudi (1866 M). Neyyar, Karamana, Vamanapuram and the Kallada rivers drain the area. The average annual rainfall is 2500-3000 mm and the temperature ranges from 13^{0}c to 29^{0}c.

This range is having an almost uninterrupted belt of natural forests, mainly evergreen type, extending from south to north and the forest is known for its proportionatly higher number of endemics and rare elements. The very rare Myristica swamps are found in the Palode, Kulathupuzha and Shendurney areas. The forests are mostly evergreen type with about 80 km^2 of plantations in the lower reaches. The habitat is fragmented at Ponmudi area due to the estates and developmental programmes. However, the contiguity is maintained through Tamil Nadu.

Most of the forest areas have been degraded especially due to the fire occurrence leading to severe soil erosion problem. It becomes worse considering the steepness on the western part of this range of Western Ghats.

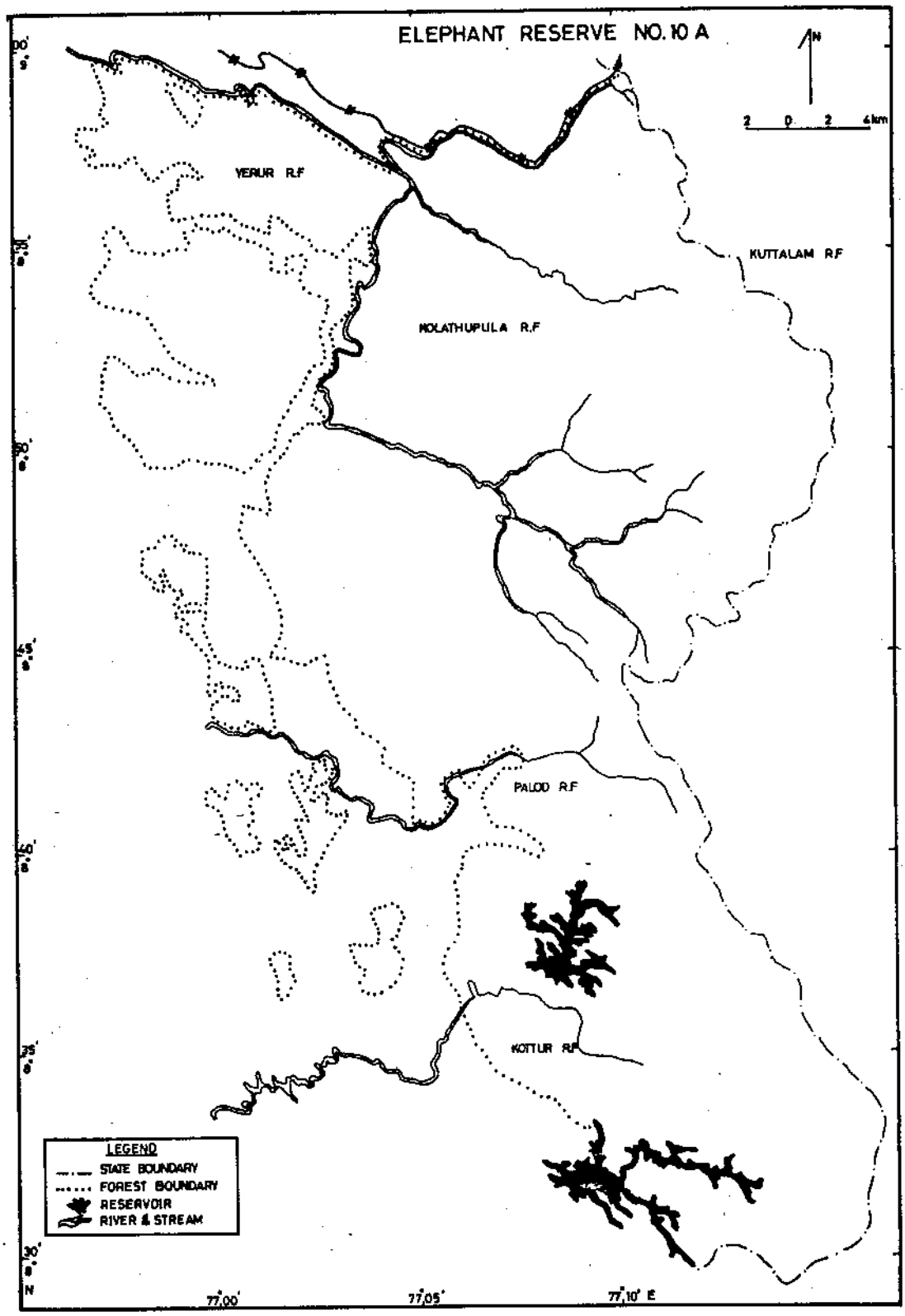

ELEPHANT RESERVE NO. 10 A
N
2 0 2 4km
YERUR R.F
KUTTALAM R.F
KOLATHUPULA R.F
PALOD R.F
KOTTUR R.F
LEGEND
STATE BOUNDARY
FOREST BOUNDARY
RESERVOIR
RIVER & STREAM
77°00'
77°05'
77°10' E

Table 7. Details of Major Reserve Forests in Elephant Reserve No. 10A

Sl. No.	Name of R.F.	Area (km^2)	Sl. No.	Name of R.F.	Area (km^2)
1.	Kimala	0.87	13.	Valiamala	0.33
2.	Kimala extenstion	0.67	14.	Palode	0.88
3.	Kottur	1.51	15.	Vamanapuram	0.81
4.	Puthuveetumur	0.02	16.	Kumil	0.82
5.	Vazhichal	0.14	17.	Pachamala	0.36
6.	Elamkonathukadu	0.09	18.	Shekkonan	0.82
7.	Cheriyancode	0.52	19.	Manjaparakunnu	0.93
8.	Mookunni	0.12	20.	Elambracode	0.66
9.	Thirumala	0.02	21.	Yerur	118.65
10.	Choolimala	0.57	22.	Kulathupuzha	487.74
11.	Arianad	0.54	23.	Aryankavu	77.70
12.	Thonganpara	0.37			

Elephant population

Density of elephants in the Reserve was estimated to be 0.20 elephants/km^2. Paruthippally Range of Trivandrum Forest Division had the highest density - followed by Kulathupuzha and Neyyar Ranges. The overall male-female sex ratio was 1:2.4. The Southern most portions of the Reserve is believed to have a population of dwarf elephants locally known as 'Kallana'.

Other Wildlife in the Reserve

The Reserve with contiguous forest areas of Kalakkad-Mundanthurai hold a good population of Lion-tailed macaque in addition to Nilgiri tahr and other herbivores. A preliminary survey indicates presence of a number of lesser cats and other small mammals.

Human habitations

There are about 160 tribal settlements in the areas, most of which are on the fringes. About 30 of them are in the Protected Areas scattered right inside the forests. 1800 house holds are solely dependant on forests for their fire wood requirement. Fodder requirements of 900 house holds are met exclusivly from the surrounding forests.

MANAGEMENT PROBLEMS

The major management problems of the Reserve are:

1. Habitat degradation

A portion of the Reserve especially in Palode and Kulathupuzha Forest Ranges are degraded due to biotic pressures.

2. Man - Wildlife conflict

The scattered settlements and the estates in the fringes add to the problem of man- wildlife conflict especially in the southern part of the Reserve. The major crops in the settlements are tapioca, palntain, paddy, coconut and pepper. Coconut and arecanuts planted along the border of Bonacaud estates attract elephants. Crop damages have been reported from all the areas (Fig. 15). A few settlements are protected by live- wire fencing.

3. Biotic pressures

The dependance on forests by the settlements and surrounding villages is one of the major source of disturbance and causative factor for degradation.

RECOMMENDATIONS

Acquisition of land

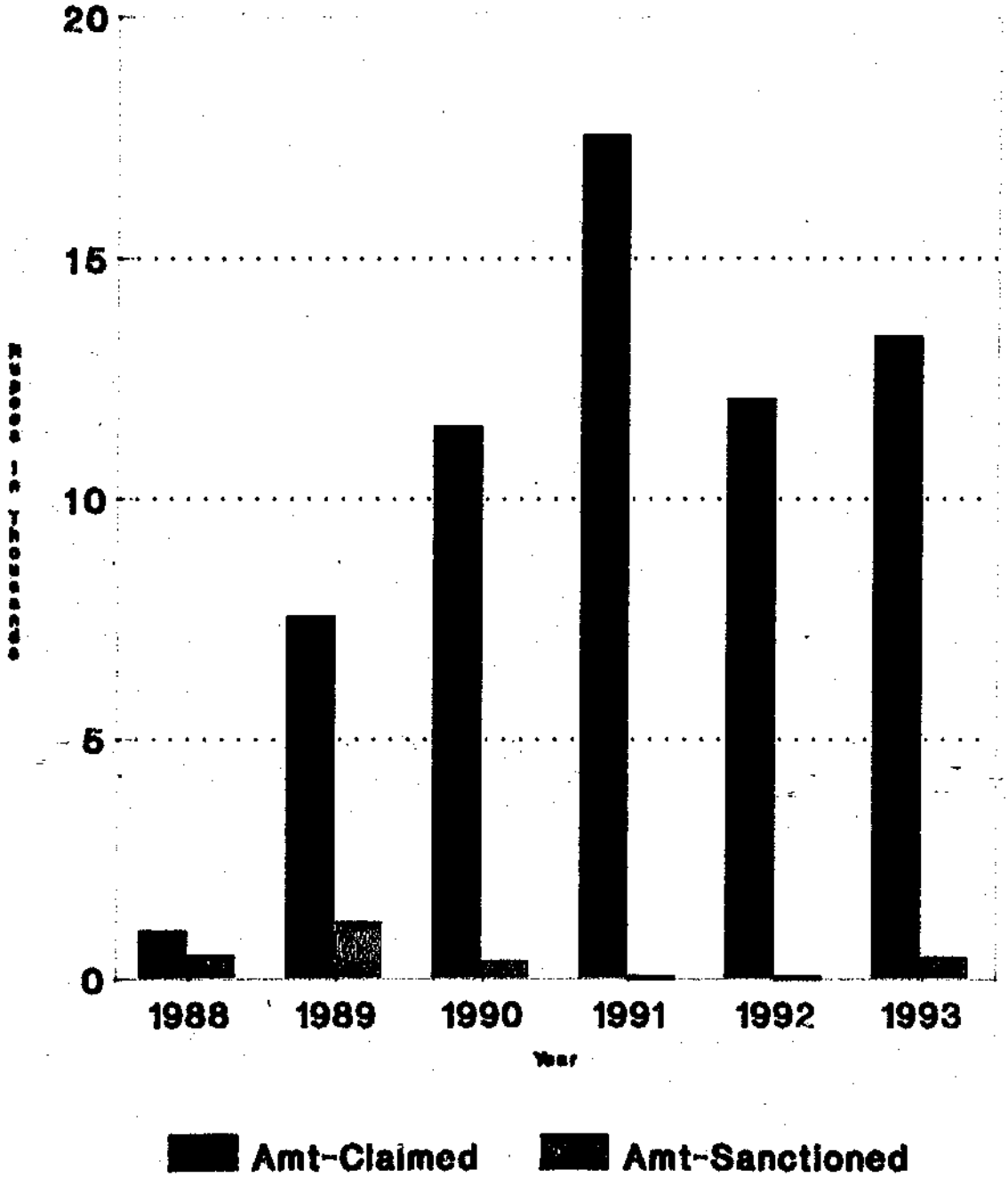
The tribal settlements scattered within the Protected Areas in the Reserve, though a source of disturbance, do not contribute much to discontiguity of habitat. The Kallar Estate in Shenduruney, presently owned by different people may be taken over. The tribal settlements within the Reserve may be protected through live wire fencing.

Habitat improvement

Considering the severity of the problem, soil and moisture conservation measures are recommended especially on the western part of the reserve. Fire

Fig. 15. Compensation Details

Agasthyamala Region



protection measure have to be improved and strictly implemented. Enrichment of habitat through planting could also be taken up.

Dwarf Elephant Survey

The southern part of the Reserve comprising Neyyar and Peppara Wildlife Sanctuaries is reported to hold a population of dwarf elephants. The area may be surveyed for the dwarf elephants.

Eco-development programmes

Considering the number of settlements and villages depending on the forests, priority may be given to suitable alternate energy sources. Unemployment among the tribals force them to indulge in activities destructive to the forests. Job-oriented self supporting training programmes utilising the local resources may be planned for the tribals.

MANAGEMENT OF CAPTIVE ELEPHANTS

Kerala has the largest number of elephants in captivity. About 550 elephants are under captive management in Kerala. This provides employment to about 5,000 persons and over 2,000 families are dependent on these. The number of requests from temples and individuals are always on the increase.

Forest Department is presently maintaining elephants in seven elephant camps. The number of elephants with the Department have reduced considerably owing to the sale of elephants, especially the males. Considering the present condition of elephant camps, the present population of captive elephants and the requests for more elephants, the following programmes are suggested.

Training Programme for Mahouts

The large number of elephants in captivity and the difficulty of getting trained Mahouts lead to several problems especially during festival seasons. The attitude and approach of mahouts in controlling elephants have recently been the subject of discussion among wildlife enthusiasts and elephant lovers. Lack of skill and knowledge about life of elephants on the part of mahouts is considered to be the major reason for the whole trouble with Captive Elephants.

The Forest Department organised a training programme for selected mahouts in 1993 and they were briefed of various aspects of management. The response was encouraging. Hence it is proposed to have a Training School at Trichur.

Advantages of the Training in Kerala

About 550 elephants are managed in captivity in the State. About 1,500 mahouts are involved in the management.

- Experts of College of Veterinary and Animal Sciences and the 'traditional elephant physicians' are available for lectures and demonstrations.

- Wildlife Scientists of Kerala Forest Research Institute are available for lectures on wild elephants.

- The elephants in the elephant camp at Kodanad could be utilised for the training programme.

- Elephant Welfare Society, a Registered Society with elephant owners, mahouts, Scientists as members would collaborate with the programme.

The Training programme could include basics of elephant life, capture methods, behaviour, biology, restraining techniques, etc.

Maintaining a breeding stock

The elephant camps of forest department are ideally located near or inside forests. However,due to lack of enough number of elephants, the rate of elephant births have decreased considerably. Hence, it is proposed that a breeding stock of elephants may be maintained in elephant camps by capturing the isolated population in Lower Periyar areas in Idukki.

VETERINARY CARE

Health of the population is an important factor for maintaining a viable population. There has been no attempts to monitor the health of animals in the wild. An enthusiastic Officer had taken the initiative to immobilise an ailing elephant, treat it and then release it to the wild in Chinnar Wildlife Sanctuary. But for this, there was no such instances in the history of wildlife management in Kerala.

Most of the elephant habitats have enclosures and are surrounded by villages. Modern agricultural practices using fertilizers, insecticides and pesticides are major threats to the eco-system and thereby to the wildlife. The effect of these on the animals is still unknown.

Natural death of animals are often reported casually stating some reasons as the cause of death. Post-mortem examinations have become mere rituals to close the files and further investigations not done. Considering these, it is important to have veterinary units in all major reserves equipped with all facilities for field examination and treatment.

A proper coordination and cooperation between veterinarians in the field and academic institutions would facilitate easy diagnosis and proper treatment of diseases.

PROTECTION OF ANIMALS

Habitat shrinkage and degradation combined with poaching for tusks pose major threats to the survival of elephants in the wild. The ever increasing man-wildlife conflict more often lead to the death of the animal. The number of poaching cases reported from different areas (Fig.16) indicate that legislation and ban of ivory trade has not helped to the extent expected for saving the elephant. The selected removal of males from the population leads to a disparate sex ratio adversely affecting the long term conservation of the species. Strengthening the existing protection force and formation of an Intelligence Wing would help to solve the problem to a great extent.

The poaching cases registered indicate the vulnerability of the species both in Protected Areas and territorial forests. The latest figures also point out that all the areas are equally vulnerable. Considering the poaching cases reported and the vulnerability of areas the following measures are suggested to improve protection facilities.

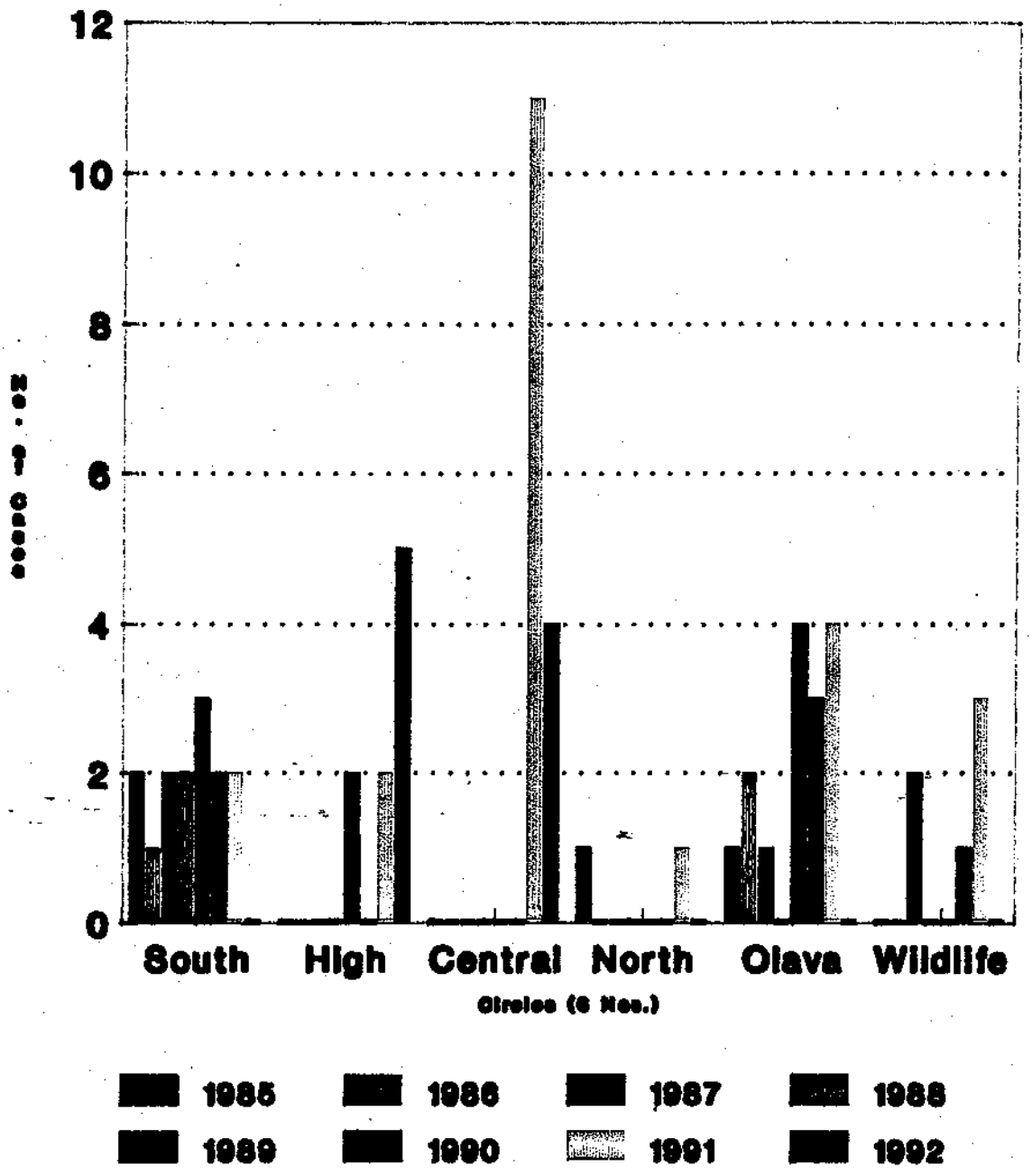
Joint Patrolling of border areas

A major portion of forests in Kerala is bordered by Tamil Nadu. The northern part is bordered by Karnataka. The three States accuse each other for poaching incidence and illicit tree felling and other activities. But for the stray cases of co-operation between officials of Indira Gandhi Wildlife Sanctuary and Parambikulam Wildlife Sanctuary, there had not been any joint effort to control poaching in the border areas. Conferences are often convened to sort out the problems, but never followed up. Hence, it is suggested that the officials of bordering areas meet as and when possible and discuss and exchange information on protection problems. Further, at least one wireless set with a similar frequency may be maintained in the States.

Joint Patrolling by the field staff may be planned in the border areas. Further, information on habitual offenders of each State may be handed over to others and a database maintained.

Fig. 16. Circle wise Poaching cases

Elephant



Southern, High Range, Central, Northern, Olavakkad, Wildlife and Special Circles

Wireless network

At present, wireless communication facilities are available mostly in Protected Areas. The available sets also require periodic checking and maintenance. Enough number of sets and walkie talkies have to be provided to the field staff to facilitate communication. This will also help in building up confidence among the staff.

Arms for the staff

Lack of enough number weapon has been a major complaint of the staff for a long time. This is all the more important while perambulating the border areas for armed poachers.

Strengthening of staff

The staff strength in most of the areas are not sufficient to implement various programmes of the Forest Department. Moreover, the available staff are also not properly deployed to avoid unnecessary wastage of man power. It is suggested that the staff strength in the areas may be reviewed and increased to meet new challenges.

Legislation

Arms are of no use, unless given the power to shoot at poachers and other offenders. The officials may be given the power to shoot at sight any offender inside the forests. Habitual offenders may be put behind bars, if necessary using appropriate Act.

Intelligence Wing

Prevention, rather than detection of the offence should be given priority in wildlife. This requires an Intelligence Wing with trained and able officers with aptitude for intelligence work. A network of duly rewarded informants and trained officers would enable to prevent offences and also to follow up cases detected.

CONSERVATION EDUCATION

Well informed public, especially in the areas surrounding the forests, ensures successful implementation of any programme. The people in the area are mostly educated and to a certain extent are aware of the need for conservation. However, due to the crop damage and human deaths due to wildlife, they are forced to take a negative attitudes towards wildlife conservation. More over, they are not properly informed of the tangible benefits of conservation of forests and wildlife.

The present system of conducting Nature Camps by Forest Department attracts thousands of people. The hundreds of pending requests for participation in the camps is an indication of the success of the programme. These camps provide an opportunity to the participants to listen to experts in the field and learn more through audio-visuals. More over, the field trip organised as a part of the camp, viewing wildlife and identifying plants, give them the more required first hand information on the nature and its diversity. More often, the discussions in the camp turns out to be a forum for exchange of ideas between the people and the officials. A majority of the participants return from the camp pledging to assist in conservation programmes including protection. At least a few become informants without any personal motives. There had also been instances where participants have dug water holes in a Wildlife Sanctuary.

At present, Nature camps are organised only in Protected Areas. Considering the importance of the Programme covering larger areas, it is important to conduct such camps in more places. Wider publicity to the programme may be given and local people given preference while selecting the participants.

A mobile Unit equipped with audio-visuals would help in reaching the people in all the places and convey the message of conservation. These Units may be stationed centrally in each Reserve and manned by people with an aptitude for conservation education and skill in communication. They should be trained properly to execute the task.

Museum

Elephant is a part of the culture of the people in the state. It is looked upon with mixed feelings of love and fear. However, knowledge on different aspects of life of elephant is still lacking among the people leading to several stories on its life such as mating in water. It is only natural that people would be interested to know more about this majestic creature of the wild.

Establishment of a centrally located museum would help wildlife enthusiasts to study more about this awe-inspiring animal. The museum will also convey different aspects of Project Elephant Programme through audio-visuals, exhibits and literature. This could also be a centre for a Reference library on literature pertained to elephants.

RESEARCH

Elephant is a part of the Indian Culture from time immemorial. The 'Hasthyayurveda', 'Sukraneethi' and 'Mathangalila' are probably the first literature exclusively dealing with various aspects of elephants. However, in the recent past, only very few studies have been conducted to assess the status and distribution, and ecological and behavioural aspects.

Most of the studies on ecology and behaviour of Asian elephants have been carried out in Sri Lanka. In India, majority of the studies have been carried out in the South. Status and distribution of elephant in different ranges in South India have been reported by Krishnan (1972), Nair *et al* (1977), Vijayan *et al* (1979), Sukumar (1985) and Daniel *et al* (1988). Long term studies on the ecology and behaviour have been carried out by Sukumar (1985) in Sathyamangalam Forests, Easa (1989) in Parambikulam Wildlife Sanctuary, Sivaganesan and Ajay Desai in Mudumalai Wildlife Sanctuary and Ramesh Kumar in Danganikotta.

Studies on captive elephants have also been very few compared to those in Sri Lanka. Hematological studies were reported by Simon (1961), Nirmalan *et al.* (1967) and Nirmalan and Nair (1969). Nutritional requirements of elephants in captivity was studied by Ananthasubramaniam (1980). Easa (1987) reported the chemical nature of temporal gland secretion.

At present, Bombay Natural History Society and Centre for Ecological Science are engaged in ecological studies in Karnataka and Tamil Nadu. Kerala Forest Research Institute is studying Man- wildlife conflict, habitat utilisation and food and feeding habits in Protected Areas in Kerala.

The foregoing brief discussion point out the inadequacy of field studies on elephants and its habitat, especially in the management point of view. Based on the information on the status and distribution of elephants in the State, rapid survey of the habitat and discussions with wildlife managers and experts, the following research programmes are suggested in different Elephant Reserves in Kerala:

Elephant Reserve No.7

- Long-term monitoring of the population.
- Evaluation and monitoring of habitat.
- Movement pattern of selected herds with radio-telemetry.
- Studies on the parasites.

Elephant Reserve No.8

- Effect of habitat improvement programmes on the populations.

Elephant Reserve No.9

- Movement pattern of selected herds with radio-telemetry.
- Evaluation of habitat.
- Studies on the control of *Michaenia* species (the weed).
- Vegetation mapping and floristic studies.

Elephant Reserve No.9A

- Short-term study on the isolated population and long-term monitoring of habitat after capture.
- Genetic studies of the population.

Elephant Reserve No.10

- Long-term monitoring of population.
- Movement pattern and habitat utilisation.
- Studies on the parasites.
- Vegetation mapping and floristic studies.

Elephant Reserve No.10A

- Impact of elephants on vegetation.
- Vegetation studies.

Successful implementation of research programmes would require infrastructural facilities in different areas. Field Research Stations are proposed in major Reserves.

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ELEPHANT RESERVE NO.7

Budget for 1st year

Rupees in Lakhs

Sl. No.	Items	Forest Divisions					
		Kannur	North Wayanad	Wayanad (WL)	South Wayanad	Kozhikode	Total
1.	Acquisition of land @ Rs.1000/- per Cent	10.00	20.00	-	20.00	-	50.00
2.	Habitat Improvement						
	a. Habitat enrichment	0.50	0.50	1.50	0.75	0.25	3.50
	b. Soil and moisture conservation	0.50	0.75	1.25	1.00	0.50	4.00
	c. Water holes	-	0.50	1.00	0.50	0.25	2.25
	d. Fire Protection	0.60	0.60	1.25	1.00	0.75	4.20
	e. Weeding	0.25	0.25	0.50	0.25	0.25	1.50
3.	Compensation	0.25	0.50	1.00	1.00	0.25	3.00
4.	Live-wire fencing maintenance	-	0.50	1.00	0.50	-	2.00
5.	Trench maintenance	-	-	-	0.75	-	0.75
6.	Eco-development	0.50	0.50	0.75	0.50	0.25	2.50
7.	Fodder development	-	-	0.50	-	-	0.50
8.	Awareness Programmes						
	a. Mobile unit	-	-	-	-	-	-
	b. Nature camps	-	0.25	0.25	-	-	0.50
9.	Research and Monitoring	-	-	-	-	-	2.00
10.	Field Research Station	-	-	-	-	-	0.50
11.	Mobile Veterinary Unit	-	-	-	-	-	4.00
12.	Protection and communication	0.50	0.75	1.25	1.00	0.50	4.00
		13.10	25.10	10.25	27.25	3.00	85.20

ELEPHANT RESERVE NO.7

Budget for 2nd year

Rupees in Lakhs

Sl. No.	Items	Forest Divisions					
		Kannur	North Wayanad	Wayanad (WL)	South Wayanad	Kozhikode	Total
1.	Acquisition of land @ Rs.1000/- per Cent	15.00	25.00	-	25.00	-	65.00
2.	Habitat Improvement						
	a. Habitat enrichment maintenance	0.25	0.25	1.00	0.35	0.25	2.10
	b. Soil and moisture conservation	0.25	0.50	0.75	0.50	0.25	2.25
	c. Water holes maintenance	0.25	0.25	0.50	0.25	0.25	1.50
	d. Fire Protection	0.50	0.50	1.00	0.75	0.50	3.25
	e. Weeding	0.10	0.10	0.25	0.10	0.10	0.65
3.	Compensation	0.25	0.50	1.50	1.00	0.25	3.50
4.	Live-wire fencing maintenance	-	0.25	0.50	0.25	-	1.00
5.	Trench maintenance	-	-	-	0.50	-	0.50
6.	Eco-development	0.20	0.20	0.25	0.25	0.15	1.05
7.	Fodder development	0.10	0.10	0.20	0.10	-	0.50
8.	Awareness Programmes						
	a. Mobile unit	-	-	-	-	-	-
	b. Nature camps	-	0.25	0.50	-	-	0.75
9.	Research and Monitoring	-	-	-	-	-	4.00
10.	Field Research Station	-	-	-	-	-	0.50
11.	Mobile Veterinary Unit	-	-	-	-	-	3.00
12.	Protection and communication	0.50	0.75	1.25	1.00	0.50	4.00
		17.40	28.65	7.70	30.05	2.25	93.55

ELEPHANT RESERVE NO.7

Budget for 3rd year

Rupees in Lakhs

Sl. No.	Items	Forest Divisions					
		Kannur	North Wayanad	Wayanad (WL)	South Wayanad	Kozhikode	Total
1.	Acquisition of land @ Rs.1000/- per Cent	15.00	30.00	-	30.00	-	75.00
2.	Habitat Improvement						
	a. Habitat enrichment maintenance	0.25	0.25	0.75	0.50	0.25	2.00
	b. Soil and moisture conservation	0.25	0.25	0.25	0.25	0.25	1.25
	c. Water holes maintenance	-	0.25	0.25	0.25	0.25	1.00
	d. Fire Protection	0.60	0.60	1.00	0.75	0.50	3.45
	e. Weeding	-	-	0.25	-	0.25	0.50
3.	Compensation	0.25	0.50	1.00	0.50	0.25	2.50
4.	Live-wire fencing maintenance	-	0.50	1.00	0.50	-	2.00
5.	Trench maintenance	-	-	-	0.50	-	0.50
6.	Eco-development	0.25	0.25	0.25	0.25	-	1.00
7.	Fodder development	-	0.25	0.25	0.25	-	0.75
8.	Awareness Programmes						
	a. Mobile unit	-	-	-	-	-	-
	b. Nature camps	-	0.25	0.50	-	-	0.75
9.	Research and Monitoring	-	-	-	-	-	3.00
10.	Field Research Station	-	-	-	-	-	0.50
11.	Mobile Veterinary Unit	-	-	-	-	-	3.00
12.	Protection and communication	0.50	0.75	1.25	1.00	0.50	4.00
		17.10	33.85	6.75	34.75	2.25	101.20

ELEPHANT RESERVE NO.7

Budget for 4th year

Rupees in Lakhs

Sl. No.	Items	Forest Divisions					
		Kannur	North Wayanad	Wayanad (WL)	South Wayanad	Kozhikode	Total
1.	Acquisition of land @ Rs.1000/- per Cent	15.00	30.00	-	30.00	-	75.00
2.	Habitat Improvement						
	a. Habitat enrichment maintenance	0.20	0.25	0.25	0.25	0.25	1.20
	b. Soil and moisture conservation	0.25	0.25	0.25	0.25	0.50	1.50
	c. Water holes maintenance	-	0.25	0.25	0.25	0.25	1.00
	d. Fire Protection	0.60	0.60	1.25	1.00	0.75	4.20
	e. Weeding	-	-	0.25	-	-	0.25
3.	Compensation	0.25	0.50	1.00	0.75	0.25	2.75
4.	Live-wire fencing maintenance	-	0.25	0.25	0.25	-	0.75
5.	Trench maintenance	-	-	-	0.75	-	0.75
6.	Eco-development	-	0.50	0.50	0.25	-	1.25
7.	Fodder development	-	-	-	-	-	-
8.	Awareness Programmes						
	a. Mobile unit	-	-	-	-	-	-
	b. Nature camps	-	0.25	0.50	-	-	0.75
9.	Research and Monitoring	-	-	-	-	-	3.00
10.	Field Research Station	-	-	-	-	-	0.50
11.	Mobile Veterinary Unit	-	-	-	-	-	2.00
12.	Protection and communication	0.25	0.50	0.75	0.50	0.25	2.25
		16.55	33.35	5.25	34.25	2.25	97.15

ELEPHANT RESERVE NO.7

Budget for 5th year

Rupees in Lakhs

Sl. No.	Items	Forest Divisions					
		Kannur	North Wayanad	Wayanad (WL)	South Wayanad	Kozhikode	Total
1.	Acquisition of land @ Rs.1000/- per Cent	5.00	40.00	-	40.00	5.00	90.00
2.	Habitat Improvement						
	a. Habitat enrichment maintenance	0.25	0.25	0.50	0.25	0.25	1.50
	b. Soil and moisture conservation	0.10	0.10	0.20	0.20	0.15	0.75
	c. Water holes maintenance	-	0.10	0.20	0.20	0.10	0.60
	d. Fire Protection	0.60	0.60	0.75	0.50	0.50	2.95
	e. Weeding	-	-	-	-	-	-
3.	Compensation	0.25	0.50	0.75	0.50	0.25	2.25
4.	Live-wire fencing maintenance	-	0.25	0.25	0.25	-	0.75
5.	Trench maintenance	-	-	-	0.25	-	0.25
6.	Eco-development	0.50	0.25	0.25	0.25	0.25	1.50
7.	Fodder development	-	-	-	-	-	-
8.	Awareness Programmes						
	a. Mobile unit	-	-	-	-	-	-
	b. Nature camps	-	0.25	0.50	-	-	0.75
9.	Research and Monitoring	-	-	-	-	-	3.00
10.	Field Research Station	-	-	-	-	-	0.25
11.	Mobile Veterinary Unit	-	-	-	-	-	2.00
12.	Protection and communication	0.25	0.25	0.50	0.50	0.25	1.75
		6.95	42.55	3.90	42.90	6.75	108.30

ELEPHANT RESERVE NO.8

Budget for 1st Year

Rupees in Lakhs

Sl. No.	Items	Forest Divisions					
		Nilambur South	Nilambur North	Silent Valley	Mannarghat	Palakkad	Total
1.	Aquisition of land @ Rs.1000/- per Cent	-	35.00	-	-	-	35.00
2.	Habitat Improvement						
	a. Habitat enrichment	0.25	0.75	-	0.50	0.50	2.00
	b. Soil and moisture conservation	0.40	0.50	-	0.30	0.30	1.50
	c. Water holes	0.50	0.75	-	0.35	0.35	1.95
	d. Fire Protection	1.00	1.00	1.50	1.00	0.75	5.25
	e. Weeding	0.50	0.75	0.25	0.50	0.25	2.25
3.	Compensation	0.50	0.25	0.20	0.25	0.25	1.45
4.	Live-wire fencing maintenance	-	-	-	-	-	-
5.	Trench maintenance	-	-	-	0.25	-	0.25
6.	Eco-development	-	0.50	-	-	-	0.50
7.	Fodder development	-	0.50	-	-	-	0.50
8.	Awareness Programmes						
	a. Mobile unit	-	-	-	-	-	-
	b. Nature camps	-	-	0.25	-	-	0.25
9.	Research and Monitoring	-	-	-	-	-	3.00
10.	Field Research Station	-	-	-	-	-	-
11.	Mobile Veterinary Unit	-	-	-	-	-	-
12.	Protection and communication	1.00	0.75	1.00	0.75	0.50	4.00
		4.15	40.75	3.20	3.90	2.90	57.90

ELEPHANT RESERVE NO.8

Budget for 2nd Year

Rupees in Lakhs

Sl. No.	Items	Forest Divisions					
		Nilambur South	Nilambur North	Silent Valley	Mannarghat	Palakkad	Total
1.	Aquisition of land @ Rs.1000/- per Cent	-	40.00	-	-	-	40.00
2.	Habitat Improvement						
	a. Habitat enrichment maintenance	0.25	0.25	-	0.50	0.50	1.50
	b. Soil and moisture conservation	0.20	0.25	-	0.20	0.15	0.80
	c. Water holes maintenance	0.25	0.30	-	0.20	0.20	0.95
	d. Fire Protection	1.00	1.00	1.50	1.00	0.75	5.25
	e. Weeding	0.25	0.25	0.15	0.25	0.25	1.15
3.	Compensation	0.50	0.25	0.20	0.25	0.25	1.45
4.	Live-wire fencing maintenance	-	-	-	-	-	-
5.	Trench maintenance	-	-	-	0.25	-	0.25
6.	Eco-development	0.25	0.25	0.25	0.25	0.25	1.25
7.	Fodder development	-	0.20	-	0.20	-	0.40
8.	Awareness Programmes						
	a. Mobile unit	-	-	-	-	-	-
	b. Nature camps	0.50	-	0.50	-	-	1.00
9.	Research and Monitoring	-	-	-	-	-	3.00
10.	Field Research Station	-	-	-	-	-	0.50
11.	Mobile Veterinary Unit	-	-	-	-	-	-
12.	Protection and communication	0.50	0.50	0.50	0.50	0.50	2.50
		3.70	43.25	3.10	3.60	2.85	60.00

ELEPHANT RESERVE NO.8

Budget for 3rd Year

Rupees in Lakhs

Sl. No.	Items	Forest Divisions					
		Nilambur South	Nilambur North	Silent Valley	Mannarghat	Palakkad	Total
1.	Aquisition of land @ Rs.1000/- per Cent	-	40.00	-	-	-	40.00
2.	Habitat Improvement						
	a. Habitat enrichment maintenance	0.25	0.25	-	0.25	0.25	1.00
	b. Soil and moisture conservation	0.20	0.20	-	0.15	0.15	0.70
	c. Water holes maintenance	0.15	0.20	-	0.15	0.15	0.65
	d. Fire Protection	0.50	0.50	0.50	0.50	0.25	2.25
	e. Weeding	0.15	0.15	-	-	-	0.30
3.	Compensation	0.50	0.25	0.20	0.25	0.25	1.45
4.	Live-wire fencing maintenance	-	-	-	-	-	-
5.	Trench maintenance	-	-	-	0.25	-	0.25
6.	Eco-development	-	0.25	0.25	0.25	0.25	1.00
7.	Fodder development	-	-	-	-	-	-
8.	Awareness Programmes						
	a. Mobile unit	-	-	-	-	-	-
	b. Nature camps	0.25	-	0.50	-	-	0.75
9.	Research and Monitoring	-	-	-	-	-	2.00
10.	Field Research Station	-	-	-	-	-	0.25
11.	Mobile Veterinary Unit	-	-	-	-	-	-
12.	Protection and communication	0.50	0.25	0.50	0.25	0.25	1.75
		2.50	42.05	1.95	2.05	1.55	52.35

ELEPHANT RESERVE NO.8

Budget for 4th Year

Rupees in Lakhs

Sl. No.	Items	Forest Divisions					
		Nilambur South	Nilambur North	Silent Valley	Mannarghat	Palakkad	Total
1.	Aquisition of land @ Rs.1000/- per Cent	-	40.00	-	-	-	40.00
2.	Habitat Improvement						
	a. Habitat enrichment maintenance	0.25	0.25	-	0.25	0.25	1.00
	b. Soil and moisture conservation	0.20	0.25	-	0.10	0.10	0.65
	c. Water holes maintenance	0.20	0.25	-	0.15	0.15	0.75
	d. Fire Protection	0.50	0.50	0.50	0.50	0.25	2.25
	e. Weeding	0.20	0.20	-	0.20	-	0.60
3.	Compensation	0.50	0.25	0.20	0.25	0.25	1.45
4.	Live-wire fencing maintenance	-	-	-	-	-	-
5.	Trench maintenance	-	-	-	0.25	-	0.25
6.	Eco-development	-	-	-	-	-	-
7.	Fodder development	-	-	-	-	-	-
8.	Awareness Programmes						
	a. Mobile unit	-	-	-	-	-	-
	b. Nature camps	0.25	-	0.50	-	-	0.75
9.	Research and Monitoring	-	-	-	-	-	2.00
10.	Field Research Station	-	-	-	-	-	0.25
11.	Mobile Veterinary Unit	-	-	-	-	-	-
12.	Protection and communication	0.50	0.50	0.50	0.50	0.25	2.25
		2.60	42.20	1.70	2.20	1.25	52.20

ELEPHANT RESERVE NO.8

Budget for 5th Year

Rupees in Lakhs

Sl. No.	Items	Forest Divisions					
		Nilambur South	Nilambur North	Silent Valley	Mannarghat	Palakkad	Total
1.	Aquisition of land @ Rs.1000/- per Cent	-	40.00	-	-	-	40.00
2.	Habitat Improvement						
	a. Habitat enrichment maintenance	0.25	0.25	-	0.25	0.25	1.00
	b. Soil and moisture conservation	0.20	0.25	-	0.10	0.10	0.65
	c. Water holes maintenance	0.20	0.25	-	0.10	0.10	0.65
	d. Fire Protection	1.00	1.00	1.50	1.00	0.75	5.25
	e. Weeding	-	-	-	-	-	-
3.	Compensation	0.50	0.25	0.20	0.25	0.25	1.45
4.	Live-wire fencing maintenance	-	-	-	-	-	-
5.	Trench maintenance	-	-	-	-	-	-
6.	Eco-development	-	0.25	-	0.25	-	0.50
7.	Fodder development	-	-	-	-	-	-
8.	Awareness Programmes						
	a. Mobile unit	-	-	-	-	-	-
	b. Nature camps	0.25	-	0.50	-	-	0.75
9.	Research and Monitoring	-	-	-	-	-	2.00
10.	Field Research Station	-	-	-	-	-	0.25
11.	Mobile Veterinary Unit	-	-	-	-	-	-
12.	Protection and communication	1.00	0.75	1.00	0.75	0.50	4.00
		3.40	43.00	3.20	2.70	1.95	56.50

ELEPHANT RESERVE NO.9

Budget for 1st Year

Rupees in Lakhs

Sl. No.	Items	Forest Divisions										
		Parambi-kulam	Nemmara	Thrissur	Chalak-kudi	Vazhachal	Malayattur	Kotha-mangalam	Mankulam	Munnar	Idukki (WL)	Total
1.	Acquisition of land @ Rs.1000/- per Cent	-	10.00	-	-	-	-	-	-	-	55.00	65.00
2.	Habitat Improvement											
	a. Enrichment of habitat	1.00	0.50	0.25	0.25	0.75	0.40	0.25	-	-	0.75	4.15
	b. Soil and moisture conservation	0.50	0.50	0.25	0.25	0.30	0.30	0.25	0.25	0.25	0.25	3.10
	c. Water holes	0.40	0.50	0.25	0.35	0.70	0.25	0.30	-	0.30	0.50	3.55
	d. Fire Protection	1.00	0.75	0.50	0.50	0.75	0.75	0.50	0.25	0.50	0.50	6.00
	e. Weeding	0.75	0.50	-	0.25	1.00	1.00	0.50	0.05	-	0.25	4.30
3.	Compensation	0.25	0.25	0.10	0.20	0.25	0.20	0.25	0.25	0.50	0.25	2.50
4.	Live-wire fencing maintenance	-	-	-	-	-	-	-	-	-	-	-
5.	Trench maintenance	-	-	-	-	-	-	-	-	-	-	-
6.	Eco-development	0.50	0.25	-	0.25	-	0.25	-	-	-	0.75	2.00
7.	Fodder development	-	-	-	-	-	-	-	-	-	0.50	0.50
8.	Awareness Programmes											
	a. Mobile Unit	-	-	-	-	-	-	-	-	-	-	3.00
	b. Nature camps	0.50	-	-	-	-	-	-	-	-	0.50	1.00
9.	Research and Monitoring	-	-	-	-	-	-	-	-	-	-	6.00
10.	Field Research Station	-	-	-	-	-	-	-	-	-	-	1.00
11.	Mobile Veterinary Unit	-	-	-	-	-	-	-	-	-	-	4.00
12.	Museum	-	-	-	-	-	-	-	-	-	-	-
13.	Training for Mahouts	-	-	-	-	-	-	-	-	-	-	5.00
14.	Protection and communication	0.75	0.50	0.25	0.50	0.75	0.50	0.25	0.50	0.50	0.50	5.00
		5.65	13.75	1.60	2.55	4.50	3.65	2.30	1.30	2.05	59.75	116.00

ELEPHANT RESERVE NO.9

Budget for 2nd Year

Rupees in Lakhs

Sl. No.	Items	Forest Divisions										
		Parambi-kulam	Nemmara	Thrissur	Chalak-kudi	Vazhachal	Malayattur	Kotha-mangalam	Mankulam	Munnar	Idukki (WL)	Total
1.	Acquisition of land @ Rs.1000/- per Cent	-	10.00	-	-	-	-	-	-	-	40.00	50.00
2.	Habitat Improvement											
	a. Enrichment of habitat maintenance	0.25	0.25	0.25	0.25	0.50	0.20	0.25	0.20	0.20	0.50	2.85
	b. Soil and moisture conservation	0.25	0.25	0.25	0.25	0.30	0.30	0.25	0.25	0.25	0.25	2.60
	c. Water holes maintenance	0.20	0.25	0.15	0.20	0.30	0.25	0.15	-	0.10	0.25	1.85
	d. Fire Protection	1.00	0.50	0.50	0.50	0.50	0.50	0.50	0.25	0.50	0.50	5.25
	e. Weeding	0.30	0.25	0.10	0.25	0.50	0.50	0.25	0.15	0.15	0.15	2.60
3.	Compensation	0.25	0.25	0.10	0.20	0.25	0.20	0.25	0.25	0.10	0.25	2.10
4.	Live-wire fencing maintenance	-	-	-	-	-	-	-	-	-	0.50	0.50
5.	Trench maintenance	-	-	-	-	-	-	-	-	-	-	-
6.	Eco-development	0.25	0.25	-	0.25	0.25	0.25	-	-	0.25	0.35	1.85
7.	Fodder development	-	-	-	-	-	-	-	-	-	0.25	0.25
8.	Awareness Programmes											
	a. Mobile Unit	-	-	-	-	-	-	-	-	-	-	2.00
	b. Nature camps	0.50	-	-	-	-	-	-	-	-	0.50	1.00
9.	Research and Monitoring	-	-	-	-	-	-	-	-	-	-	6.00
10.	Field Research Station	-	-	-	-	-	-	-	-	-	-	0.25
11.	Mobile Veterinary Unit	-	-	-	-	-	-	-	-	-	-	1.00
12.	Museum	-	-	-	-	-	-	-	-	-	-	15.00
13.	Training for Mahouts	-	-	-	-	-	-	-	-	-	-	15.00
14.	Protection and communication	0.75	0.50	0.25	0.50	0.75	0.50	0.25	0.50	0.50	0.50	5.00
		3.75	12.50	1.60	2.40	3.35	2.70	1.90	1.60	2.05	44.00	115.10

ELEPHANT RESERVE NO.9

Budget for 3rd Year

Rupees in Lakhs

Sl. No.	Items	Forest Divisions										
		Parambi-kulam	Nemmara	Thrissur	Chalak-kudi	Vazhachal	Malayattur	Kotha-mangalam	Mankulam	Munnar	Idukki (WL)	Total
1.	Acquisition of land @ Rs.1000/- per Cent	-	10.00	-	-	-	-	-	-	-	-	10.00
2.	Habitat Improvement											
	a. Enrichment of habitat maintenance	0.25	0.15	0.10	0.10	0.20	0.20	0.10	-	-	0.25	1.35
	b. Soil and moisture conservation	0.20	0.20	0.20	0.10	0.10	0.10	-	-	-	0.25	1.15
	c. Water holes maintenance	0.20	0.15	0.10	0.15	0.20	0.10	0.10	-	-	0.20	1.20
	d. Fire Protection	0.50	0.25	0.25	0.25	0.30	0.25	0.25	0.15	0.20	0.25	2.65
	e. Weeding	-	-	-	-	0.50	0.25	0.25	0.05	-	-	1.05
3.	Compensation	-	-	-	-	0.25	0.20	0.25	-	-	0.25	0.95
4.	Live-wire fencing maintenance	-	-	-	-	-	-	-	-	-	0.25	0.25
5.	Trench maintenance	-	-	-	-	-	-	-	-	-	-	-
6.	Eco-development	0.25	0.25	-	0.25	0.25	-	-	-	0.25	0.25	1.50
7.	Fodder development	-	-	-	-	-	-	-	-	-	0.10	0.10
8.	Awareness Programmes											
	a. Mobile Unit	-	-	-	-	-	-	-	-	-	-	1.00
	b. Nature camps	0.25	-	-	-	-	-	-	-	-	0.50	0.75
9.	Research and Monitoring	-	-	-	-	-	-	-	-	-	-	4.00
10.	Field Research Station	-	-	-	-	-	-	-	-	-	-	0.25
11.	Mobile Veterinary Unit	-	-	-	-	-	-	-	-	-	-	1.00
12.	Museum	-	-	-	-	-	-	-	-	-	-	5.00
13.	Training for Mahouts	-	-	-	-	-	-	-	-	-	-	5.00
14.	Protection and communication	0.50	0.25	0.25	0.25	0.50	0.25	0.25	0.25	0.25	0.25	3.00
		2.15	11.25	0.90	1.10	2.30	1.35	1.20	0.45	0.70	2.55	40.20

ELEPHANT RESERVE NO.9

Budget for 4th Year

Rupees in Lakhs

Sl. No.	Items	Forest Divisions										
		Parambi-kulam	Nemmara	Thrissur	Chalak-kudi	Vazhachal	Malayattur	Kotha-mangalam	Mankulam	Munnar	Idukki (WL)	Total
1.	Acquisition of land @ Rs.1000/- per Cent	-	10.00	-	-	-	-	-	-	-	-	10.00
2.	Habitat Improvement											
	a. Enrichment of habitat maintenance	0.25	0.25	0.10	0.20	0.25	0.25	0.15	0.15	-	0.25	1.85
	b. Soil and moisture conservation	0.20	0.20	0.15	0.15	0.10	0.10	0.10	-	-	0.15	1.15
	c. Water holes maintenance	0.15	0.15	0.10	0.15	0.15	0.10	0.10	-	-	0.20	1.10
	d. Fire Protection	0.50	0.50	0.25	0.25	0.25	0.25	0.25	0.20	0.20	0.25	2.90
	e. Weeding	-	-	-	-	0.25	0.25	0.25	-	-	-	0.75
3.	Compensation	-	-	-	-	0.25	0.20	0.25	0.25	-	0.25	1.20
4.	Live-wire fencing maintenance	-	-	-	-	-	-	-	-	-	0.25	0.25
5.	Trench maintenance	-	-	-	-	-	-	-	-	-	-	-
6.	Eco-development	0.25	-	-	-	0.25	-	-	-	0.25	0.25	1.00
7.	Fodder development	-	-	-	-	-	-	-	-	-	0.25	0.25
8.	Awareness Programmes											
	a. Mobile Unit	-	-	-	-	-	-	-	-	-	-	1.00
	b. Nature camps	0.50	-	-	-	-	-	-	-	-	0.50	1.00
9.	Research and Monitoring	-	-	-	-	-	-	-	-	-	-	3.00
10.	Field Research Station	-	-	-	-	-	-	-	-	-	-	0.25
11.	Mobile Veterinary Unit	-	-	-	-	-	-	-	-	-	-	2.00
12.	Museum	-	-	-	-	-	-	-	-	-	-	5.00
13.	Training for Mahouts	-	-	-	-	-	-	-	-	-	-	5.00
14.	Protection and communication	0.50	0.25	0.25	0.25	0.25	0.25	0.15	0.25	0.25	0.25	2.65
		2.35	1.35	0.85	1.00	1.75	1.40	1.25	0.85	0.70	2.60	40.35

ELEPHANT RESERVE NO.9

Budget for 5th Year

Rupees in Lakhs

Sl. No.	Items	Forest Divisions										
		Parambi-kulam	Nemmara	Thrissur	Chalak-kudi	Vazhachal	Malayattur	Kotha-mangalam	Mankulam	Munnar	Idukki (WL)	Total
1.	Acquisition of land @ Rs.1000/- per Cent	-	-	-	-	-	-	-	-	-	-	-
2.	Habitat Improvement											
	a. Enrichment of habitat maintenance	0.50	0.25	-	0.15	0.25	0.15	0.10	-	-	0.25	1.65
	b. Soil and moisture conservation	0.20	0.15	0.15	0.10	0.10	0.10	-	-	-	0.15	0.95
	c. Water holes maintenance	0.20	0.20	0.10	0.15	0.15	0.10	0.10	-	0.10	0.20	1.30
	d. Fire Protection	0.50	0.50	0.25	0.25	0.50	0.50	0.50	0.25	0.20	0.25	3.70
	e. Weeding	-	-	-	-	0.25	0.25	0.15	-	-	-	0.65
3.	Compensation	-	-	-	-	0.25	0.20	0.25	0.25	-	0.25	1.20
4.	Live-wire fencing maintenance	-	-	-	-	-	-	-	-	-	0.25	0.25
5.	Trench maintenance	-	-	-	-	-	-	-	-	-	-	-
6.	Eco-development	0.25	0.25	-	-	0.25	-	-	-	-	0.25	1.00
7.	Fodder development	-	-	-	-	-	-	-	-	-	0.25	0.25
8.	Awareness Programmes											
	a. Mobile Unit	-	-	-	-	-	-	-	-	-	-	1.00
	b. Nature camps	0.50	-	-	-	-	-	-	-	-	0.50	1.00
9.	Research and Monitoring	-	-	-	-	-	-	-	-	-	-	3.00
10.	Field Research Station	-	-	-	-	-	-	-	-	-	-	0.25
11.	Mobile Veterinary Unit	-	-	-	-	-	-	-	-	-	-	2.00
12.	Museum	-	-	-	-	-	-	-	-	-	-	5.00
13.	Training for Mahouts	-	-	-	-	-	-	-	-	-	-	5.00
14.	Protection and communication	0.50	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	2.75
		2.65	1.60	0.75	0.90	2.00	1.55	1.35	0.75	0.55	2.60	30.95

ELEPHANT RESERVE NO.9A

Budget for 1st Year

Rupees in Lakhs

Sl. No.	Items	Forest Divisions		
		Idukki (WL)	Kottayam	Total
1.	Acquisition of land @ Rs.1000/- per Cent	-	-	-
2.	Habitat Improvement a. Habitat Enrichment	0.25	0.25	0.50
	b. Soil and moisture conservation	0.50	0.50	1.00
	c. Water holes	-	0.25	0.25
	d. Fire Protection	0.50	0.75	1.25
	e. Weeding	-	0.25	0.25
3.	Compensation	0.25	0.50	0.75
4.	Live-wire fencing maintanence	-	-	-
5.	Trench maintenance	-	-	-
6.	Eco-development	0.50	0.50	1.00
7.	Fodder development	0.25	0.25	0.50
8.	Awareness Programmes a. Mobile unit	-	-	-
	b. Nature camps	0.50	-	0.50
9.	Research and Monitoring	-	-	2.50
10.	Field Research Station	-	-	-
11.	Mobile Veterinary Unit	-	-	-
12.	Capturing of isolated population	-	-	6.00
13.	Protection and communication	0.50	0.75	1.25
		3.25	4.00	15.75

ELEPHANT RESERVE NO.9A

Budget for 2nd Year

Rupees in Lakhs

Sl. No.	Items	Forest Divisions		
		Idukki (WL)	Kottayam	Total
1.	Acquisition of land @ Rs.1000/- per Cent	-	10.00	10.00
2.	Habitat Improvement a. Habitat Enrichment maintenance	0.25	0.25	0.50
	b. Soil and moisture conservation	0.25	0.25	0.50
	c. Water holes maintenance	-	0.25	0.25
	d. Fire Protection	0.50	0.75	1.25
	e. Weeding	-	0.25	0.25
3.	Compensation	0.25	0.50	0.75
4.	Live-wire fencing maintanence	-	-	-
5.	Trench maintenance	-	-	-
6.	Eco-development	0.25	0.25	0.50
7.	Fodder development	-	-	-
8.	Awareness Programmes a. Mobile unit	-	-	-
	b. Nature camps	0.50	-	0.50
9.	Research and Monitoring	-	-	2.50
10.	Field Research Station	-	-	-
11.	Mobile Veterinary Unit	-	-	-
12.	Capturing of isolated population	-	-	-
13.	Protection and communication	0.50	0.25	0.75
		2.50	12.75	17.75

ELEPHANT RESERVE NO.9A

Budget for 3rd Year

Rupees in Lakhs

Sl. No.	Items	Forest Divisions		
		Idukki (WL)	Kottayam	Total
1.	Acquisition of land @ Rs.1000/- per Cent	-	10.00	10.00
2.	Habitat Improvement a. Habitat Enrichment maintenance	0.25	0.25	0.50
	b. Soil and moisture conservation	0.20	0.20	0.40
	c. Water holes maintenance	-	0.15	0.15
	d. Fire Protection	0.25	0.50	0.75
	e. Weeding	-	-	-
3.	Compensation	0.25	0.50	0.75
4.	Live-wire fencing maintanence	-	-	-
5.	Trench maintenance	-	-	-
6.	Eco-development	0.25	0.25	0.50
7.	Fodder development	-	-	-
8.	Awareness Programmes a. Mobile unit	-	-	-
	b. Nature camps	0.25	-	0.25
9.	Research and Monitoring	-	-	2.00
10.	Field Research Station	-	-	-
11.	Mobile Veterinary Unit	-	-	-
12.	Capturing of isolated population	-	-	-
13.	Protection and communication	0.25	0.25	0.50
		1.70	12.10	15.80

ELEPHANT RESERVE NO.9A

Budget for 4th Year

Rupees in Lakhs

Sl. No.	Items	Forest Divisions		
		Idukki (WL)	Kottayam	Total
1.	Acquisition of land @ Rs.1000/- per Cent	-	10.00	10.00
2.	Habitat Improvement a. Habitat Enrichment maintenance	0.25	0.25	0.50
	b. Soil and moisture conservation	0.50	0.50	1.00
	c. Water holes maintenance	-	0.15	0.15
	d. Fire Protection	0.25	0.25	0.50
	e. Weeding	-	-	-
3.	Compensation	0.25	0.25	0.50
4.	Live-wire fencing maintanence	-	-	-
5.	Trench maintenance	-	-	-
6.	Eco-development	0.25	0.25	0.50
7.	Fodder development	-	-	-
8.	Awareness Programmes a. Mobile unit	-	-	-
	b. Nature camps	0.25	-	0.25
9.	Research and Monitoring	-	-	2.00
10.	Field Research Station	-	-	-
11.	Mobile Veterinary Unit	-	-	-
12.	Capturing of isolated population	-	-	-
13.	Protection and communication	0.25	0.25	0.50
		2.00	11.90	15.90

ELEPHANT RESERVE NO.9A

Budget for 5th Year

Rupees in Lakhs

Sl. No.	Items	Forest Divisions		
		Idukki (WL)	Kottayam	Total
1.	Acquisition of land @ Rs.1000/- per Cent	-	-	-
2.	Habitat Improvement a. Habitat Enrichment maintenance	0.25	0.25	0.50
	b. Soil and moisture conservation	-	-	-
	c. Water holes maintenance	-	0.25	0.25
	d. Fire Protection	0.25	0.50	0.75
	e. Weeding	-	-	-
3.	Compensation	0.25	0.50	0.75
4.	Live-wire fencing maintanence	-	-	-
5.	Trench maintenance	-	-	-
6.	Eco-development	-	-	-
7.	Fodder development	-	-	-
8.	Awareness Programmes a. Mobile unit	-	-	-
	b. Nature camps	0.50	-	0.50
9.	Research and Monitoring	-	-	2.00
10.	Field Research Station	-	-	-
11.	Mobile Veterinary Unit	-	-	-
12.	Capturing of isolated population	-	-	-
13.	Protection and communication	0.25	0.25	0.50
		1.50	1.75	5.25

ELEPHANT RESERVE NO.10

Budget for 1st Year

Rupees in Lakhs

Sl. No.	Items	Forest Divisions					
		Periyar	Ranni	Konni	Punalur	Achenkovil	Total
1.	Acquisition of land @ Rs.1000/- per Cent	-	-	-	-	-	-
2.	Habitat Improvement						
	a. Habitat enrichment	0.50	0.75	0.75	0.25	0.75	3.00
	b. Soil and moisture conservation	0.50	0.75	0.75	0.25	0.50	2.75
	c. Water holes	0.25	0.50	0.50	0.25	0.50	2.00
	d. Fire Protection	0.50	0.75	0.75	0.25	0.50	2.75
	e. Weeding	-	0.10	0.10	-	0.25	0.45
3.	Compensation	0.25	0.25	0.25	-	0.25	1.00
4.	Live-wire fencing maintenance	-	-	-	-	-	-
5.	Trench maintenance	-	-	-	-	-	-
6.	Eco-development	-	0.25	0.25	-	-	0.50
7.	Fodder development	-	0.25	0.25	-	-	0.50
8.	Awareness Programmes						
	a. Mobile unit	-	-	-	-	-	-
	b. Nature camps	0.50	-	-	-	-	0.50
9.	Research and Monitoring	-	-	-	-	-	4.00
10.	Field Research Station	-	-	-	-	-	2.00
11.	Mobile Veterinary Unit	-	-	-	-	-	-
12.	Protection and Communication	1.00	1.00	0.50	0.25	1.00	3.75
		3.50	4.60	4.10	1.25	3.75	23.20

ELEPHANT RESERVE NO.10

Budget for 2nd Year

Rupees in Lakhs

Sl. No.	Items	Forest Divisions					
		Periyar	Ranni	Konni	Punalur	Achenkovil	Total
1.	Acquisition of land @ Rs.1000/- per Cent	-	10.00	10.00	-	-	20.00
2.	Habitat Improvement						
	a. Habitat enrichment maintenance	0.25	0.50	0.50	0.25	0.50	2.00
	b. Soil and moisture conservation	0.25	0.25	0.25	0.25	0.25	1.25
	c. Water holes maintenance	0.25	0.25	0.25	0.25	0.25	1.25
	d. Fire Protection	0.25	0.50	0.50	0.25	0.50	2.00
	e. Weeding	-	0.10	0.10	-	0.25	0.45
3.	Compensation	0.25	0.25	0.25	-	0.25	1.00
4.	Live-wire fencing maintenance	-	-	-	-	-	-
5.	Trench maintenance	-	-	-	-	-	-
6.	Eco-development	-	0.25	0.25	-	-	0.50
7.	Fodder development	-	-	-	-	-	-
8.	Awareness Programmes						
	a. Mobile unit	-	-	-	-	-	-
	b. Nature camps	0.25	-	-	-	-	0.25
9.	Research and Monitoring	-	-	-	-	-	4.00
10.	Field Research Station	-	-	-	-	-	1.00
11.	Mobile Veterinary Unit	-	-	-	-	-	-
12.	Protection and Communication	0.50	0.50	0.50	0.25	0.50	2.25
		2.00	12.60	12.60	1.25	2.50	35.95

ELEPHANT RESERVE NO.10

Budget for 3rd Year

Rupees in Lakhs

Sl. No.	Items	Forest Divisions					
		Periyar	Ranni	Konni	Punalur	Achenkovil	Total
1.	Acquisition of land @ Rs.1000/- per Cent	-	10.00	10.00	-	-	20.00
2.	Habitat Improvement						
	a. Habitat enrichment maintenance	0.25	0.40	0.30	0.25	0.30	1.50
	b. Soil and moisture conservation	0.25	0.30	0.30	0.25	0.20	1.30
	c. Water holes maintenance	0.25	0.20	0.20	0.15	0.20	1.00
	d. Fire Protection	0.50	0.25	0.25	0.25	0.25	1.50
	e. Weeding	-	0.10	0.10	-	0.25	0.45
3.	Compensation	0.25	0.25	0.25	-	0.25	1.00
4.	Live-wire fencing maintenance	-	-	-	-	-	-
5.	Trench maintenance	-	-	-	-	-	-
6.	Eco-development	-	0.25	0.25	-	-	0.50
7.	Fodder development	-	-	-	-	-	-
8.	Awareness Programmes						
	a. Mobile unit	-	-	-	-	-	-
	b. Nature camps	0.25	-	-	-	-	0.25
9.	Research and Monitoring	-	-	-	-	-	2.00
10.	Field Research Station	-	-	-	-	-	0.50
11.	Mobile Veterinary Unit	-	-	-	-	-	-
12.	Protection and Communication	0.50	0.50	0.25	0.25	0.50	2.00
		2.25	12.25	11.90	1.15	1.95	32.00

ELEPHANT RESERVE NO.10

Budget for 4th Year

Rupees in Lakhs

Sl. No.	Items	Forest Divisions					
		Periyar	Ranni	Konni	Punalur	Achenkovil	Total
1.	Acquisition of land @ Rs.1000/- per Cent	-	10.00	10.00	-	-	20.00
2.	Habitat Improvement						
	a. Habitat enrichment maintenance	0.25	0.25	0.25	0.10	0.25	1.10
	b. Soil and moisture conservation	-	-	-	-	-	-
	c. Water holes maintenance	0.15	0.20	0.20	0.20	0.20	0.95
	d. Fire Protection	0.25	0.50	0.50	0.25	0.50	2.00
	e. Weeding	-	-	-	-	-	-
3.	Compensation	0.25	0.25	0.25	-	0.25	1.00
4.	Live-wire fencing maintenance	-	-	-	-	-	-
5.	Trench maintenance	-	-	-	-	-	-
6.	Eco-development	-	-	-	-	-	-
7.	Fodder development	-	-	-	-	-	-
8.	Awareness Programmes						
	a. Mobile unit	-	-	-	-	-	-
	b. Nature camps	0.25	-	-	-	-	0.25
9.	Research and Monitoring	-	-	-	-	-	2.00
10.	Field Research Station	-	-	-	-	-	0.50
11.	Mobile Veterinary Unit	-	-	-	-	-	-
12.	Protection and Communication	0.25	0.50	0.25	0.25	0.50	1.75
		1.40	11.70	11.45	0.80	1.70	29.55

ELEPHANT RESERVE NO.10

Budget for 5th Year

Rupees in Lakhs

Sl. No.	Items	Forest Divisions					
		Periyar	Ranni	Konni	Punalur	Achenkovil	Total
1.	Acquisition of land @ Rs.1000/- per Cent	-	-	-	-	-	-
2.	Habitat Improvement						
	a. Habitat enrichment maintenance	0.25	0.25	0.25	0.10	0.25	1.10
	b. Soil and moisture conservation	-	-	-	-	-	-
	c. Water holes maintenance	0.10	0.20	0.20	0.10	0.20	0.80
	d. Fire Protection	0.25	0.50	0.50	0.25	0.25	1.75
	e. Weeding	-	-	-	-	-	-
3.	Compensation	0.25	0.25	0.25	-	0.25	1.00
4.	Live-wire fencing maintenance	-	-	-	-	-	-
5.	Trench maintenance	-	-	-	-	-	-
6.	Eco-development	-	-	-	-	-	-
7.	Fodder development	-	-	-	-	-	-
8.	Awareness Programmes						
	a. Mobile unit	-	-	-	-	-	-
	b. Nature camps	0.25	-	-	-	-	0.25
9.	Research and Monitoring	-	-	-	-	-	2.00
10.	Field Research Station	-	-	-	-	-	0.50
11.	Mobile Veterinary Unit	-	-	-	-	-	-
12.	Protection and Communication	0.50	0.50	0.50	0.25	0.50	2.25
		1.60	1.70	1.70	0.70	1.45	9.65

ELEPHANT RESERVE NO.10A

Budget for 1st Year

Rupees in Lakhs

Sl. No.	Items	Forest Divisions			
		Thenmala	Trivandrum	Trivandrum (WL)	Total
1.	Acquistion of land @ Rs.1000/- per Cent	-	-	-	-
2.	Habitat improvement				
	a. Habitat enrichment	0.50	0.50	0.50	1.50
	b. Soil and moisture conservation	0.50	0.50	0.75	1.75
	c. Water holes	0.50	0.50	0.50	1.50
	d. Fire Protection	1.00	1.00	1.00	3.00
	e. Weeding	0.50	0.50	0.25	1.25
3.	Compensation	0.20	0.20	0.50	0.90
4.	Live-wire fencing maintenance	-	-	0.50	0.50
5.	Trench maintenance	-	-	-	-
6.	Eco-development	0.25	0.50	0.75	1.50
7.	Fodder development	-	-	0.50	0.50
8.	Awareness Programmes				
	a. Mobile unit	-	-	-	-
	b. Nature camps	0.30	-	0.50	0.80
9.	Research and Monitoring	-	-	-	4.00
10.	Field Research Station	-	-	-	-
11.	Mobile Veterinary Unit	-	-	-	-
12.	Protection and Communication	0.50	0.75	0.75	2.00
		4.25	4.45	6.50	19.20

ELEPHANT RESERVE NO.10A

Budget for 2nd Year

Rupees in Lakhs

Sl. No.	Items	Forest Divisions			
		Thenmala	Trivandrum	Trivandrum (WL)	Total
1.	Acquistion of land @ Rs.1000/- per Cent	20.00	-	-	20.00
2.	Habitat improvement a. Habitat enrichment maintenance	0.25	0.25	0.25	0.75
	b. Soil and moisture conservation	0.25	0.25	0.35	0.85
	c. Water holes maintenance	0.25	0.25	0.25	0.75
	d. Fire Protection	0.75	0.75	0.75	2.25
	e. Weeding	0.25	0.25	0.25	0.75
3.	Compensation	0.20	0.20	0.50	0.90
4.	Live-wire fencing maintenance	-	-	0.35	0.35
5.	Trench maintenance	-	-	-	-
6.	Eco-development	0.25	0.25	0.25	0.75
7.	Fodder development	-	-	0.25	0.25
8.	Awareness Programmes a. Mobile unit	-	-	-	-
	b. Nature camps	0.30	-	0.50	0.80
9.	Research and Monitoring	-	-	-	2.00
10.	Field Research Station	-	-	-	-
11.	Mobile Veterinary Unit	-	-	-	-
12.	Protection and Communication	0.50	0.75	0.75	2.00
		23.00	2.95	4.45	32.40

ELEPHANT RESERVE NO.10A

Budget for 3rd Year

Rupees in Lakhs

Sl. No.	Items	Forest Divisions			
		Thenmala	Trivandrum	Trivandrum (WL)	Total
1.	Acquistion of land @ Rs.1000/- per Cent	20.00	-	-	20.00
2.	Habitat improvement				
	a. Habitat enrichment maintenance	0.25	0.25	0.25	0.75
	b. Soil and moisture conservation	0.25	0.25	0.50	1.00
	c. Water holes maintenance	0.20	0.20	0.20	0.60
	d. Fire Protection	0.75	0.50	0.75	2.00
	e. Weeding	0.25	0.25	0.25	0.75
3.	Compensation	0.20	0.20	0.50	0.90
4.	Live-wire fencing maintenance	-	-	0.50	0.50
5.	Trench maintenance	-	-	-	-
6.	Eco-development	0.25	0.25	0.25	0.75
7.	Fodder development	-	-	0.25	0.25
8.	Awareness Programmes				
	a. Mobile unit	-	-	-	-
	b. Nature camps	0.30	-	0.50	0.80
9.	Research and Monitoring	-	-	-	2.00
10.	Field Research Station	-	-	-	-
11.	Mobile Veterinary Unit	-	-	-	-
12.	Protection and Communication	0.25	0.50	0.50	1.25
		22.70	2.40	4.45	31.55

ELEPHANT RESERVE NO.10A

Budget for 4th Year

Rupees in Lakhs

Sl. No.	Items	Forest Divisions			
		Thenmala	Trivandrum	Trivandrum (WL)	Total
1.	Acquistion of land @ Rs.1000/- per Cent	20.00	-	-	20.00
2.	Habitat improvement a. Habitat enrichment maintenance	0.25	0.25	0.25	0.75
	b. Soil and moisture conservation	0.20	0.20	0.25	0.65
	c. Water holes maintenance	0.20	0.20	0.20	0.60
	d. Fire Protection	0.50	0.50	0.50	1.50
	e. Weeding	0.10	0.10	0.10	0.30
3.	Compensation	0.20	0.20	0.50	0.90
4.	Live-wire fencing maintenance	-	-	0.25	0.25
5.	Trench maintenance	-	-	-	-
6.	Eco-development	-	-	-	-
7.	Fodder development	-	-	-	-
8.	Awareness Programmes a. Mobile unit	-	-	-	-
	b. Nature camps	0.30	-	0.50	0.80
9.	Research and Monitoring	-	-	-	2.00
10.	Field Research Station	-	-	-	-
11.	Mobile Veterinary Unit	-	-	-	-
12.	Protection and Communication	0.50	0.75	0.75	2.00
		22.25	2.20	3.30	29.75

ELEPHANT RESERVE NO.10A

Budget for 5th Year

Rupees in Lakhs

Sl. No.	Items	Forest Divisions			
		Thenmala	Trivandrum	Trivandrum (WL)	Total
1.	Acquistion of land @ Rs.1000/- per Cent	20.00	-	-	20.00
2.	Habitat improvement a. Habitat enrichment maintenance	0.25	0.25	0.25	0.75
	b. Soil and moisture conservation	-	-	0.10	0.10
	c. Water holes maintenance	0.15	0.15	0.15	0.45
	d. Fire Protection	0.75	0.50	0.50	1.75
	e. Weeding	-	-	-	-
3.	Compensation	0.20	0.20	0.50	0.90
4.	Live-wire fencing maintenance	-	-	0.20	0.20
5.	Trench maintenance	-	-	-	-
6.	Eco-development	-	-	-	-
7.	Fodder development	-	-	-	-
8.	Awareness Programmes a. Mobile unit	-	-	-	-
	b. Nature camps	0.30	-	0.50	0.80
9.	Research and Monitoring	-	-	-	2.00
10.	Field Research Station	-	-	-	-
11.	Mobile Veterinary Unit	-	-	-	-
12.	Protection and Communication	0.25	0.50	0.50	1.25
		21.90	1.60	2.70	28.20