

# **STATUS, FOOD AND FEEDING HABITS OF LARGER MAMMALS IN CHIMMONY WILDLIFE SANCTUARY**

E.A. Jayson  
P.S. Easa



KERALA FOREST RESEARCH INSTITUTE  
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## 1. INTRODUCTION

The State of Kerala is very rich in the diversity of animals. Kerala has a long history of protecting wild animals, the oldest protected area being the Periyar Tiger Reserve. In the year 1984, Government of Kerala established four wildlife sanctuaries namely Chendurny, Chinnar, Aralam and Chimmony. Catchment area of Chimmony river was included in the Chimmony Wildlife Sanctuary. At present about 24% of the forest area are protected as wildlife sanctuaries and national parks.

The forests of Chimmony were originally under the control of Kings of erstwhile Cochin State. Teak was the only timber in demand. Extraction of logs was started as early as in 1800. First working plan for the period 1955 - 56 to 1969 - 70 recommended selection felling in the Chimmony area, (George. 1963). Before declaring as a wildlife sanctuary, it was part of the Palappilli Forest Range. After a lapse of six years, the first management plan for the sanctuary was prepared in the year 1990 (Kaler. 1990).

Not much information is available on the fauna of Chimmony Wildlife Sanctuary other than the data reported in the management plan. Administration of this sanctuary was carried out by the wildlife warden of Parambikulam Wildlife Sanctuary initially and later it was attached with the Chalakkudy territorial Division. An Assistant wildlife warden attends to the routine administration of the sanctuary and his office is located at Chimmony Dam site.

Construction of the Chimmony dam was initiated in the year 1970. Hundreds of workers stayed in the sanctuary in connection with the building of dam

during the period of study. This study was initiated in the year 1992 with the following objectives:

1. To assess the status and distribution of larger mammals.
2. To study the food and feeding habits of larger mammals.

General status and distribution of larger mammals and their food are described in this report.

### **1.1. Review of literature**

Some of the wildlife sanctuaries in Kerala were surveyed in the past for studying the large mammals (Balakrishnan and Easa, 1984, Ramachandran *et al.*, 1986). One of the sanctuaries which has not been studied in detail is the Chimmomy Wildlife Sanctuary. NEST (1992) has published a report on the birds found in the area after a preliminary survey. Apart from this, no other information is available on the fauna of this area.

## 2. STUDY AREA

### 2.1. Location

Chimmony Wildlife Sanctuary is located in Thrissur District of Kerala State ( between  $10^{\circ} 22'N$  and  $10^{\circ}26'$  latitude and  $76^{\circ} 31'$  and  $76^{\circ} 39'E$  longitude ) on the western slopes of Nelliampathiforest. The extent of sanctuary is about 90 km<sup>2</sup> and is contiguous with Parambikulam Wildlife Sanctuary on the East and Peechi-Vazhani Wildlife Sanctuary on the West. Elevation varies from 1126 m to 2500 m above MSL. Highest points in the sanctuary are Ponnudi (928 m) and Mangattu Komban (855 m). According to the classification of Rodgers and Panwar ( 1989 ), this area comes under Biogeographic zone, Malabar Western Ghats and Biotic Province Western Ghat Mountains (Fig.

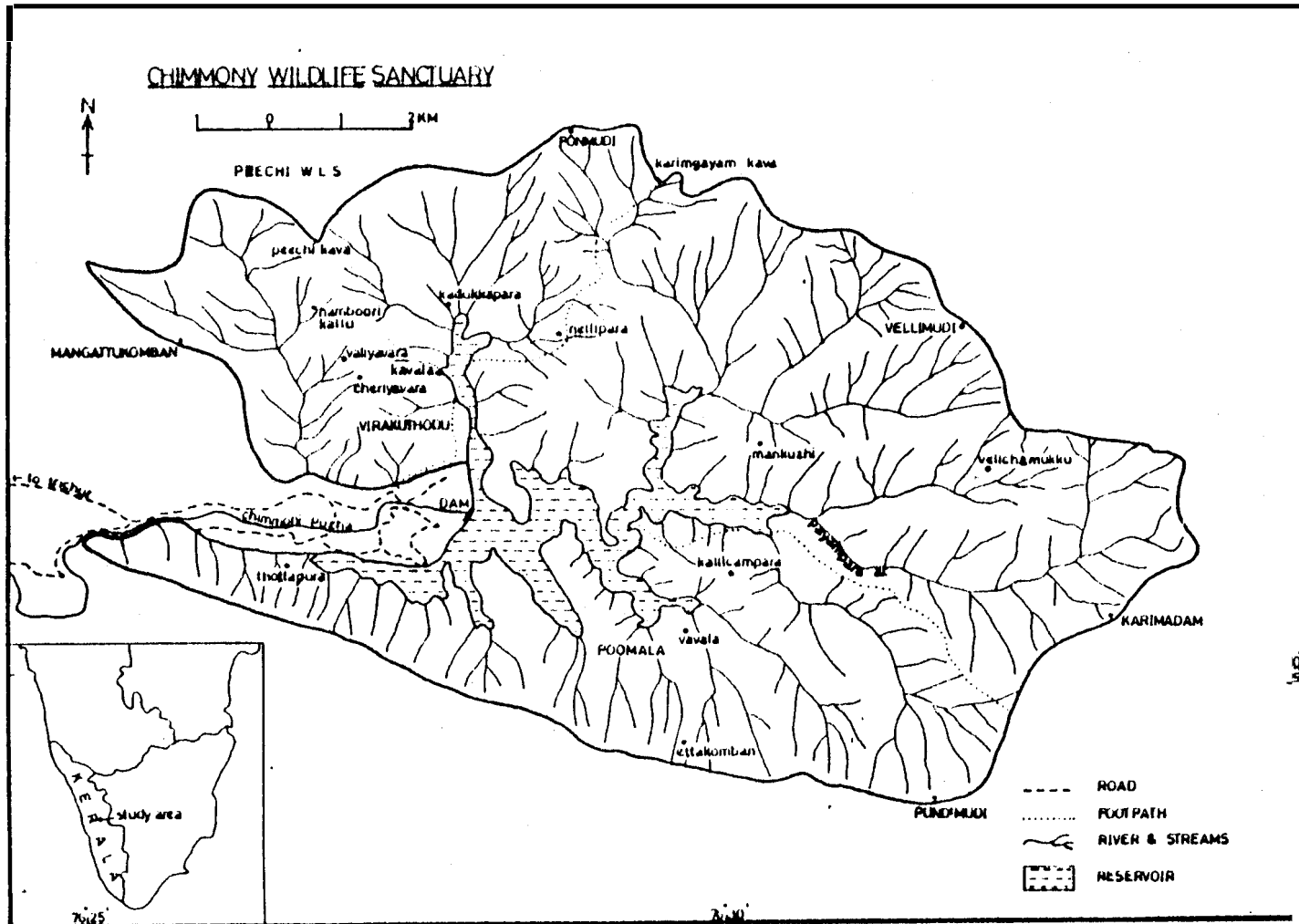


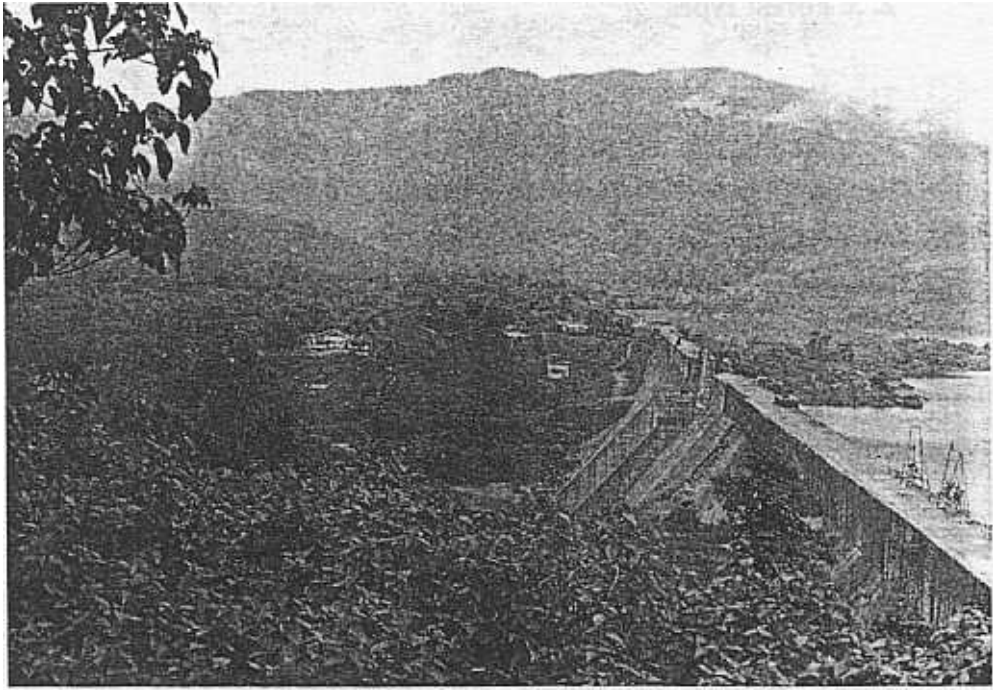
Fig. 1 Study area showing important places

### 2.3. Forest types

The vegetation of the sanctuary consists of west coast tropical wet evergreen forests, west coast semi evergreen forests, and south Indian moist deciduous forests (Champion and Seth, 1969). The former type of vegetation is found in the higher reaches.

Typical trees of top canopy are *Palaquium ellipticum*, *Calophyllum tomentosum*, *Cullenia exarillata*, *Dipterocarpus indicus* etc. Under growth is mainly composed of *Laportea crenulata*, *Ixora* sp., and *Calamus travancoricus*. In the semi evergreen forests the top canopy consist of species such as *Artocarpus hirsuta*, *Bombax ceiba*, *Syzygium cumini* etc. The lower canopy consists of species like *Cinnamomum zeylanicum*, *Mallotus philippinesis* and *Xanthophyllum flavasens*.

Most of the areas hold moist deciduous forest which merge with semi evergreen and evergreen forests at higher elevation (Plate 2). *Tectona grandis*, *Dillenia pentagyna*, *Lugersstroemia lanceolata* and *Terminalia paniculata* forming the top canopy. The lower canopy consists of *Bridelia retusa*, *Cassia fistula* and *Dillenia pentagyna*.



**Plate 1. Chimmony Dam during construction. Moist deciduous forests are in the background.**



**Plate 2. Moist deciduous forest in the vicinity of reservoir.**



### **3. METHODS**

Data was gathered by observational methods by camping at Chimmony dam site. Various parts of the sanctuary were visited on foot or by vehicles and necessary data was collected during October 1992 to June 1995. Methodology adopted in each aspect is given below.

#### **3.1. Vegetation studies**

##### **3.1.1. Girth class distribution of trees.**

Trees above 10 cm of girth at breast height (GBH) were enumerated using the point - centered quarter method. Distance to the 4 nearest trees in four quadrates were measured from the centre. Like this, 50 plots were measured in two most prominent vegetation types.

##### **3.1.2. Vegetation profile.**

A schematic diagram which resembles the physiognomy of the forest stands was drawn in the form of a profile diagram using the methods described by Richards (1952). For this a 5m x 50m strip of forest stand was demarcated and from this, the position of each tree was marked on a graph paper. Girth at breast height (GBH) and total height were recorded using a Range Finder. Crown shape of individual trees were drawn on a graph paper in the field. Using all these pictorial and quantitative data, a profile diagram was constructed with measurements to scale.

#### **3.2. Larger mammals**

Initially the whole area was traversed on foot for the reconnaissance survey. Line transects were laid in different vegetation types for censusing larger mammals but later it was abandoned as the sightings were very low.

Whenever an animal was sighted, its species, herd size, number of male and female, young ones, habitat and its activity were recorded. The location of

each animal was plotted on a grided map based on the sightings. Indirect evidences like pugmarks, pellets, dung, spoor, and foot prints were also recorded and identified. Only the larger mammals were studied excluding the bats.

To study the habitat preference of larger mammals, pellets or dung of various animals were searched in line transects of 30 m length in three different habitats namely semi evergreen and moist deciduous forests and also in teak plantations. These data were collected in every month for an year from July 1994 to June 1995. On an average, 60 samples were recorded from each habitat. But during the months of monsoon (June - August), only 20 samples were collected. Mean number of pelle/dung in each month for three different habitats was derived from this. The data were analysed using Kruskal - wallis one way analysis of variance by ranks (Siegel, 1956).

### **3.2.1. Food and feeding**

The food plants of herbivores were identified by direct observation or by examination of faecal matters. The identification of food plants from the faecal matters was based on the principle that, each species of plant will have a definite shape and pattern for the epidermal tissues. A collection of reference slides of the possible food plants were prepared showing the epidermal cells of leaf. For this, the leaf portions were boiled in a solution, made by mixing glacial acetic acid (30%) and Hydrogen peroxide. Peels of epidermal cells were taken after treatment and stained using Saffranin or Fast green. Epidermal tissues were then mounted permanently for using as reference slides.

The pellets collected from the field, were crushed and mixed with water. Leaf portions were sieved out and boiled with Sodium Hydroxide solution. From these leaf portions, peeis of epidermal tissues were prepared and slides were made. By comparing with the reference slides, the food plants contained in the pellets were identified. Species of food plants were identified by looking at the similarity in the shape of epidermal cells.

## 4. RESULTS

### 4.1. Vegetation studies.

Vegetation of an area has great influence on the distribution and Occurrence of fauna. In order to characterise and understand the type of vegetation present in the sanctuary, the vegetation were analysed as described below.

#### 4.1.1. Girth class distribution of trees.

This was derived from the data collected by the point-centered quarter method. The analysis was done in two vegetation types namely moist deciduous forest and semi evergreen forest. For the moist deciduous forest, data was collected from the Virakuthodu and for the semi evergreen forest, it was gathered from Poomala region. In both the vegetation types, trees coming in the range of 31 cm to 50 cm of GBH were in majority, which was followed by 51 cm to 70 cm category (Table 2). Trees with higher GBH were only of low percentage.

**Table 2 Frequency distribution of GBH of trees at Poomala and Virakuthodu**

GBH Classes (cms)	Poomala(%) Semi evergreen (n=501)	Virakuthodu(%) Moist deciduous (n=504)
10- 30	15	14
31 -50	28	17
51 -70	18	15
71 -90	12	11
91 - 110	6	10
111- 130	6	7
131- 150	6	9
151- 170	2	7
171- 190	2	3
191- 210	2	2
211- 230	1	1
231 - 231	12	4

n = sample size.

#### 4.1.2. Vegetation profile.

Profile diagrams of two vegetation types were prepared as described in the methods. Data for the semi evergreen forests was collected from Poomala and for the moist deciduous forest, it was from Virakuthodu. Vegetation at Poomala was typical semi evergreen forests with three tiers of canopy (Fig. 2). Top canopy consisted mainly of *Baccaurea courtallensis* so also is the case in the middle canopy. Lower canopy is composed of *Mallotus philippinesis* and *Ixora coccinia*.

At Virakuthodu a difference in the composition of species in the canopy was observed. Top layer was composed of *Lagerstroemia lanceolata* and *Gmelina arborea*. There were gaps in the canopy and only two layers of canopy were clearly visible (Fig. 3).

#### 4.2. Larger mammals.

Twenty two species of larger mammals representing all the major species found in Peninsular India. were recorded from the sanctuary during this study (Table 3). Details of sighting along with the habitats are given in the Appendix - I.

**Table 3 List of larger mammals recorded from the Chimmony Wildlife Sanctuary.**

Common name	Scientific name
<b>Primates</b>	
Bonnet macaque	<i>Macaca radiata</i> (Geoffroy)
Nilgiri langur	<i>Presbytis johni</i> (Fisher)
Lion-tailed macaque	<i>Macaca silenus</i> (Linnaeus)
<b>The Cats</b>	
Tiger	<i>Panthera tigris</i> (Linnaeus)
Leopard or Panther	<i>Panthera pardus</i> (Linnaeus)

**Table 3 contd.**

<b>Common name</b>	<b>Scientific name</b>
<b>Civets</b>	
Small Indian civet	<i>Viverricula indica</i> (Desmarest)
Common palm civet or Toddy cat	<i>Paradoxurus hermaphroditus</i> (Pallas)
<b>Mongoose</b>	
Ruddy mongoose	<i>Herpestes smithi</i> Gray
<b>Canids</b>	
Wild dog	<i>Cuon alpinus</i> (Pallas)
<b>Bear</b>	
Sloth bear	<i>Melursus ursinus</i> (Shaw)
<b>Rodents</b>	
Malabar giant squirrel	<i>Ratufa indica</i>
Threestriped palm squirrel	<i>Funambulus palamrum</i> (Linnaeus)
Indian porcupine	<i>Hystrix indica</i> (Kerr)
Blacknaped hare	<i>Lepus nigricollis</i> (F. Cuvier)
<b>Elephant</b>	
Elephant	<i>Elephas maximus</i> (Linnaeus)
<b>Wild Oxen</b>	
Gaur or Indian bison	<i>Bos gaurus</i> (H. Smith)
<b>Deer</b>	
Sambar	<i>Cervus unicolor</i> (Kerr)
Mouse deer	<i>Tragulus meminna</i> (Erxleben)
Barking deer	<i>Muntiacus muntjak</i> (Zimmermann)
Spotted deer	<i>Axis axis</i> (Erxleben)
Wild boar	<i>Sus scrofa</i> (Linnaeus)
Pangolin	<i>Manis crassicaudata</i> (Gray)

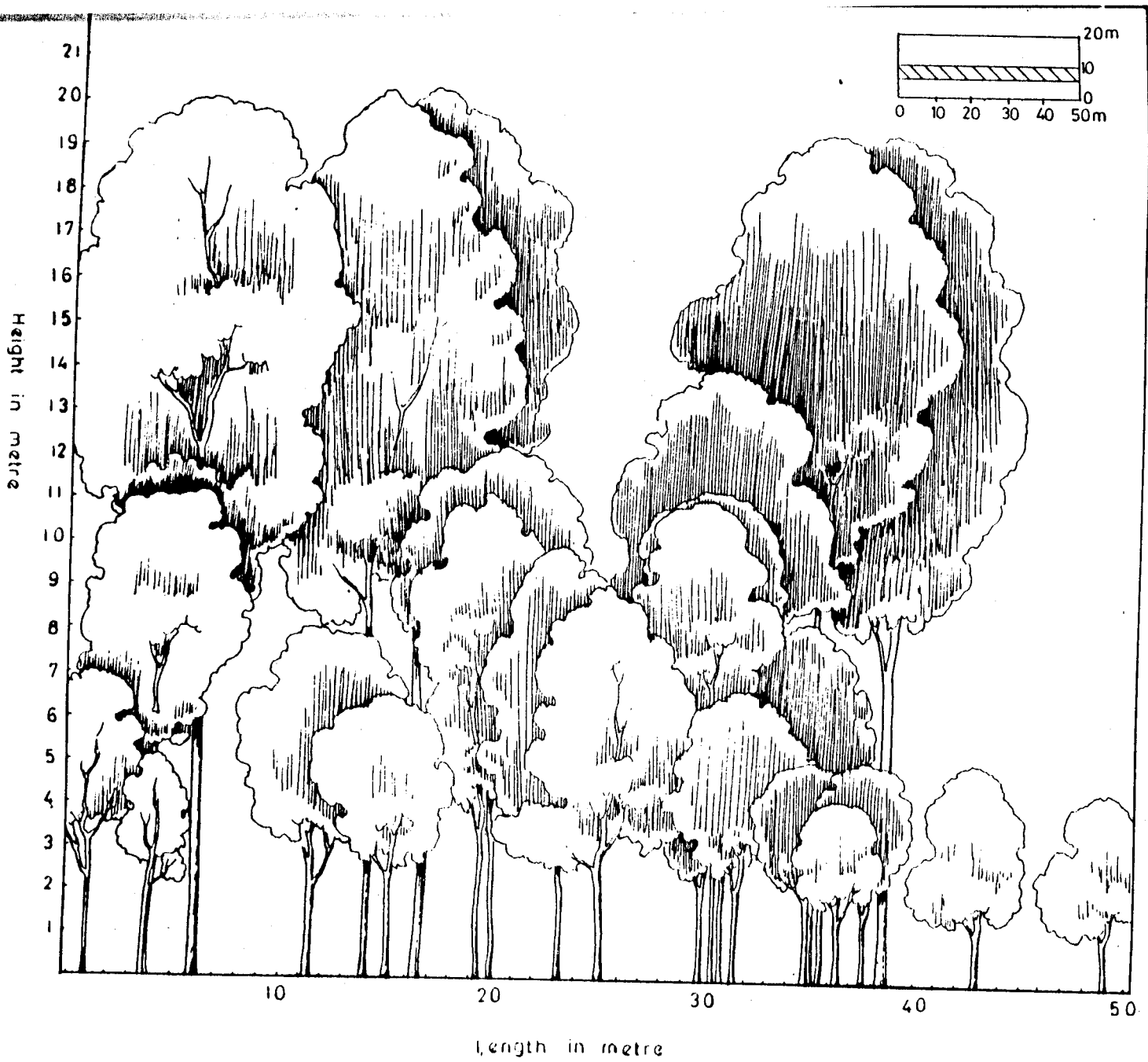


Fig. 2 Vegetation structure profile of Poomala area

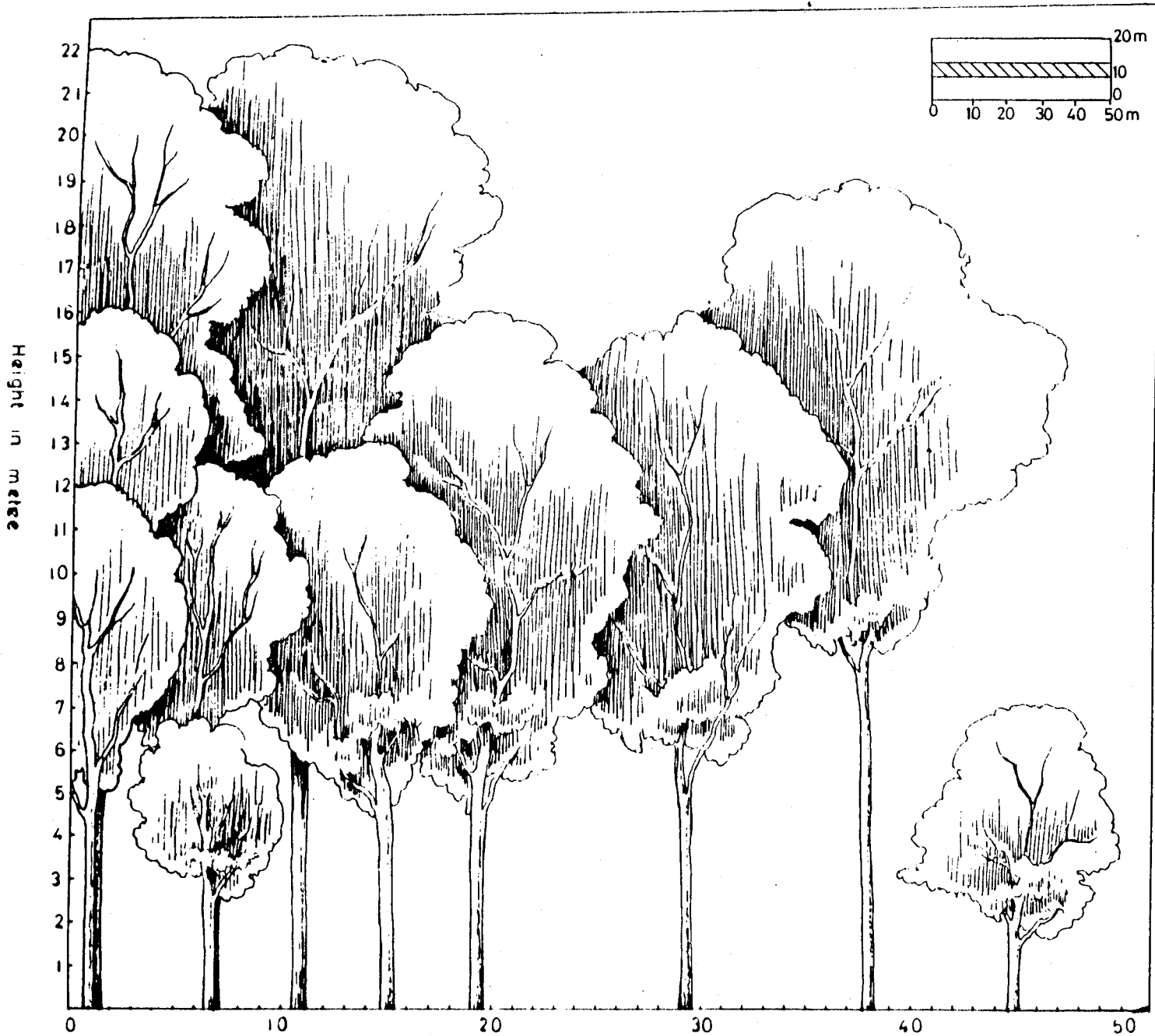


Figure 1. A forest cross-section.

### 4.2.1. Occurrence of larger mammals

Sighting of mammals was poor in the months of South - West monsoon and most of the species were located during the summer months. Sighting of mammals in different months is given in the table 4.

**Table 4 Sighting of larger mammals in different months at Chimmony Wildlife Sanctuary (November 1992 to June 1995).**

Animals	J	F	M	A	M	J	J	A	S	O	N	D
Bonnet Macaque	P	P	P	P	P	P	P	P	P	P	P	P
Nilgiri Langur	P	P	P	P	-	-	P	P	-	-	-	-
Lion - tailed Macaque	-	P	-	-	-	-	-	-	-	-	-	-
Small Indian Civet	p	-		p	-	P	-	-	-	-	-	-
Common Mongoose	-	-	-	p	-	p	-	-	-	-	-	-
Ruddy Mongoose	-	-	P	-	-	-	-	-	-	-	-	-
Wild Dog	-	P	P	-	-	-	-	-	-	-	-	-
Malabar Giant Squirrel	P	P	P	P	P	-	P	P	P	P	P	P
Threestriped Palm Squirrel	P	P	P	-	P	P	-	-	-	P	P	P
Indian Porcupine	-	-	-	-	-	-	-	-	P	P	-	-
Blacknaped Hare	P	P	P	-	P	-	P	-	P	-	-	P
Elephant	-		P	P	-	-	-	-	-	-	P	-
Gaur	-	-	-	-	p	-	p	-	-	-	P	-
Sambar	P	P	P	-	-	-	p	-	-	-	P	P
Spotted Deer	-	-	-	-	p							
Mouse Deer	-	p	p	-	p	-	p	p	-	-	-	-
Barking Deer	-	P	-	P	P	-	-	p	-	-	-	P
Wild Boar	P	P	P	P	P	P	P	-		P	P	P
Pangolin	-	-	-			-	-	-	-	-	P	-

P = Present -- = Not seen



## Primates

Among the three species of monkeys recorded from the sanctuary, the bonnet macaque was the most common. They were sighted from Poomala, Virakuthodu, Vavala, Payampara, Kallichampara, Eettakkomban, Thottapura, Nellippara, Valiavara, Kadukkappara and Chimmony Dam area (Fig.4). They were recorded in all the months. Five hundred and ninety six individuals were sighted during the period of study in 62 sightings. Troop size varied from 14 to 27 individuals. Troop composition is given in the Table 5. They are highly scared of humans and will move away from the area when approached.

**Table 5 Troop composition of bonnet macaque at Chimmony.**

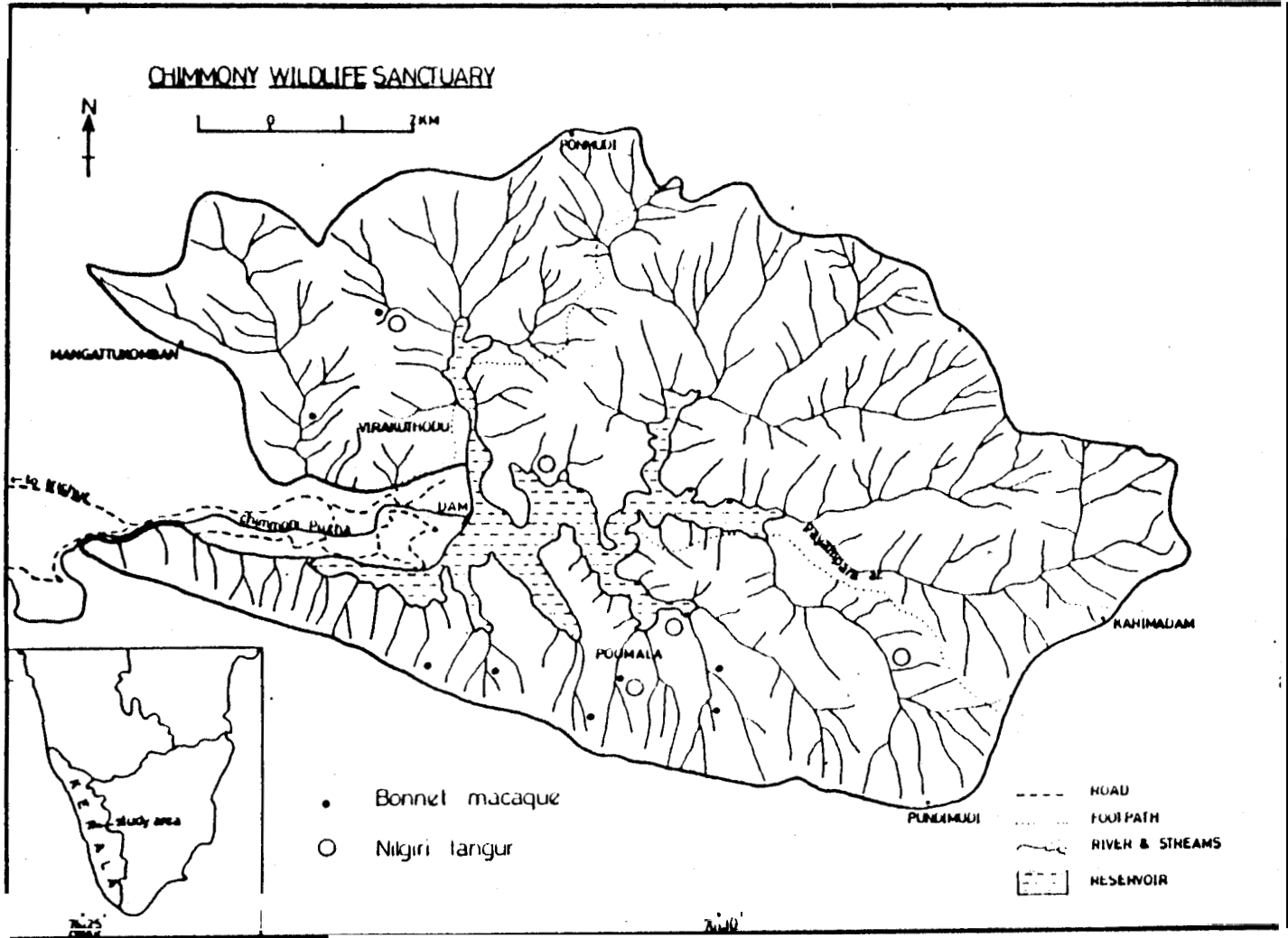
Area	Total no.	Adult	Juvenile	Young	Samplesize (n)
Virakuthodu troop	15	7	3	5	18
Poomala troop	18	9	5	4	23

Nilgiri Langur was very rare and only 38 individuals were seen during the study in 11 sightings. They were recorded from places such as Thottapura, Virakuthodu, Kallichampara, Vavala, Eettakkomban and Nellippara. Troop composition varied from 5 to 10 individuals. They were located both in the moist deciduous forests and in the semi evergreen forests. A decayed dead body of Nilgiri langur was obtained from Payampara on 12.11.92 and the cause of the death was not revealed from the dead body.

Lion-tailed Macaque was sighted only once near Vellimudi. They usually inhabit the upper reaches where dense tropical evergreen forests exist.

## Cats

Indirect evidences of tiger and leopard were recorded from many places inside the sanctuary but these big cats were never sighted. Pug mark and scat of



**Fig. 4** Distribution of primates in Chimmony Wildlife Sanctuary

tiger have been recorded from Vavala, Vellichamuku and Kallichampara. Similarly scat and pugmark of leopard were also located from Payampara, Kallichampara, Namboorikallu, Virakuthodu and Poomala.

Wild dogs were recorded from semi evergreen and moist deciduous forests. but it was absent in teak plantations. Wild dog was sighted twice during the study and both the sightings were from Virakuthodu at dawn. Droppings of wild dog were recorded from Virakuthodu, Poomala, Vavala, Payampara, Ponnudi, Nellippara, and Karimgayam Kava. They mainly feed on sambar and most of the scat samples analysed (n=20) showed the presence of sambar hair.

### **Civets**

The small Indian civet has been sighted thrice during the study. Indirect evidence of the common palm civet was also found in the sanctuary.

### **Mongoose**

Common mongoose and rudy mongoose were seen in the sanctuary. Rudy mongoose was sighted twice at Poomala.

### **Bears**

Sighting of sloth bear was very rare, but many indirect evidences were seen during the survey.

### **Rodents**

Among rodents, the Malabar giant squirrel was the most common. It was seen in all the habitats, including the teak plantations. A total of 223 individuals were seen in 92 sightings. They were sighted from Virakuthodu, Poomala, Kallichampara, Thottapara, Kavala, Payampara, Nellippara, Cheriavara, Vavala, Vellichamuku, Eettakkomban, Kadukkappara, Mankuzhi and Namboorikallu. Squirrels were sighted on sixty three occasions as solitary individuals and in pairs at 26 sightings. On one occasion, three squirrels were seen together. They mainly feed on nuts and fruits. A single observation showed that they consume the fruits of *Calophyllum inophyllum* also.

Another squirrel which was commonly found in the area is three striped palm squirrel. Ninety squirrels were found in 97 sightings from all the vegetation types during the period of study. They were recorded from Virakuthodu, Poomala, Kavala, Payampara, Kallichampara, Vavala, Chimmony dam site, Kadukkappara, Ponmudi, and Namboorikallu area.

Indian porcupine was common in the sanctuary and recorded from all the places. Sighting of this species was very rare but faecal matters were collected from most of the places. No significant difference was obtained (Kruskal - Wallis one way analysis of variance) in the use of different habitats by the porcupines (Table 6). Porcupines caused heavy damage to the tuber crops in the surrounding villages.

**Table 6 Mean number of pellets of Indian porcupine recorded from different habitats at Chimmony Wildlife Sanctuary.**

Months	Habitats		
	Teak plantation	Moist deciduous forest	Semi evergreen forest
January	0.04	0.06	0.04
February	0.04	0.10	0
March	0	0.08	0.04
April	0	0	0.05
May	0	0.05	0.05
June	0	0	0
July	0	0	-
August	0	0	-
September	0	0	0
October	0	0	0.03
November	0	0.01	0.03
December	0.04	0.01	0.04
Mean	0.01	0.03	0.03

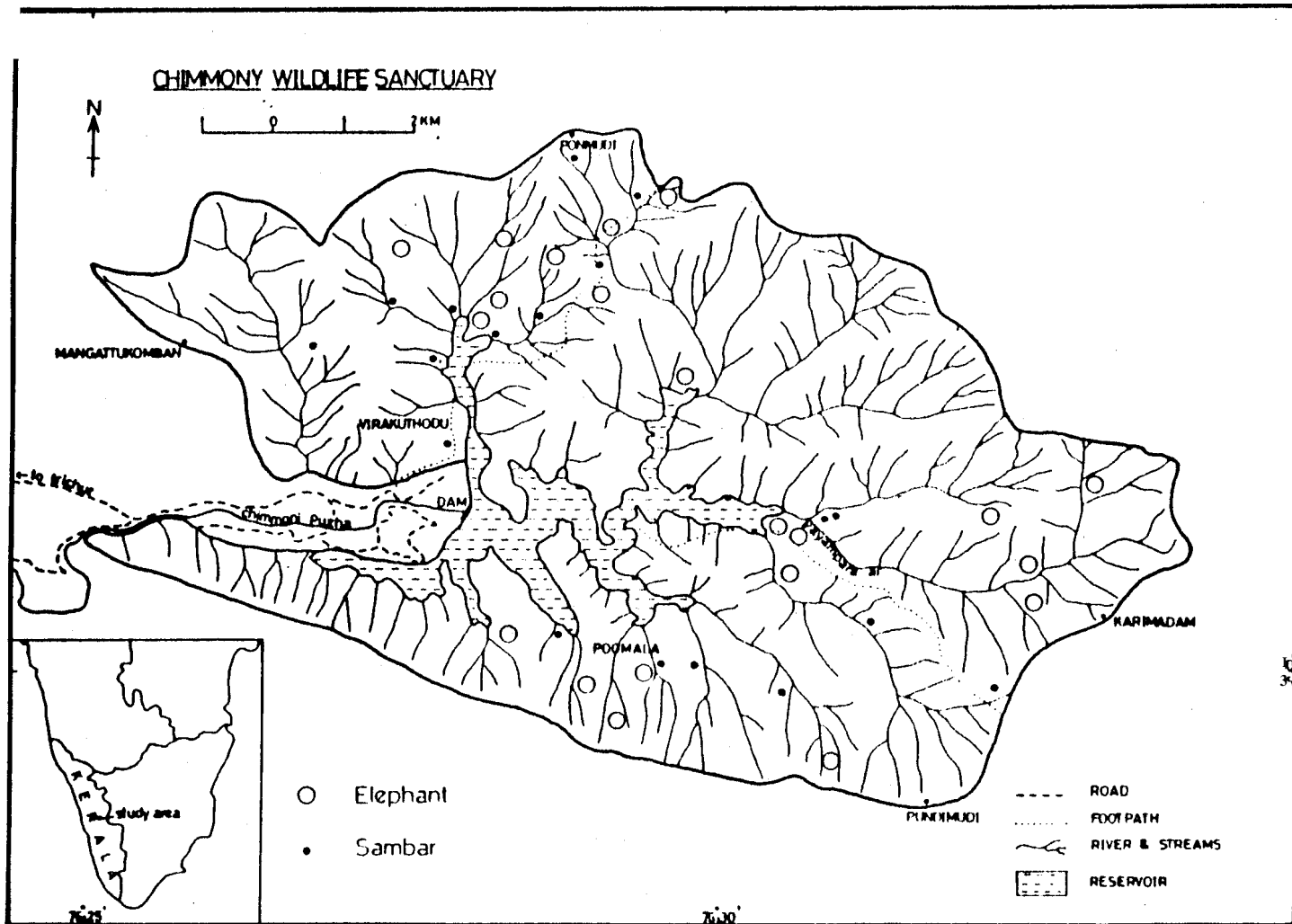
Blacknaped hare has been recorded from Virakuthodu, Poomala, Valiavara. Payampara and Peechikava. Pellets of blacknaped hare was not recorded from the semi evergreen forests, but were abundant in the moist deciduous forest as well as teak plantations (Table 7). Significant difference was obtained in the habitat use (Kruskal- Wallis one way analysis of variance,  $P=0$ ).

**Table 7 Mean number of pellets of blacknaped hare recorded from different habitats at Chimmony Wildlife Sanctuary.**

Months	Habitats		
	Teak plantation	Moist deciduous forest	Semi evergreen forest
January	0.16	0	0
February	0.12	0.01	0
March	0.03	0.04	0
April	0.1	0	0
May	0.3	0	0
June	0.3	0	0
July	0	0	-
August	0	0	-
September	0	0	0
October	0	0	0
November	0	0	0
December	0.04	0	0
Mean	0.09	0.004	0.0

## Elephant

Elephants were common in the sanctuary, but direct sighting was very rare. This was prominently due to the low density of the population and because of the lack of open areas. Elephants were sighted 6 times during the study and altogether 27 elephants were seen in herds. Even though no lone tuskers were sighted, a single adult bull was observed along with the herds. Herd composition varied from 4 to 6 animals. They were sighted at Payampara, Virakuthodu, Poomala, and Nellippara (Fig. 5).



**Fig. 5 Distribution of elephant and sambar in Chimmony Wildlife sanctuary**

Elephants at Chimmony mainly fed on bamboo. One of the prominent trees in the moist deciduous forest was the *Baccaurea courtallensis* and its fruits were heavily consumed by elephants during May, June and July. Pits created for trapping elephants still exist in between Poomala and Chimmony areas. At least once in a year elephants passed through this area. Maximum Occurrence of elephant dung was seen in the moist deciduous forest followed by semi evergreen forests (Table 8). No significant difference was obtained in the habitat use (Kruskal- Wallis one way analysis of variance).

**Table 8 Mean number of elephant dung recorded from different habitats at Chimmony Wildlife Sanctuary.**

Months	Habitats		
	Teak plantation	Moist deciduous forest	Semi evergreen forest
January	0	0.01	0.04
February	0	0.01	0.01
March	0	0.01	0.01
April	0	0	0
May	0	0	0
June	0	0	0
July	0.2	0	-
August	0	0	-
September	0	0.09	0
October	0	0.01	0
November	0	0.01	0.04
December	0	0	0.05
Mean	0.02	0.01	0.02

### Gaur

The gaur or Indian bison was recorded from the sanctuary, but the density was very low. The species was concentrated at places where there was plenty of grass and water. Gaur was sighted 5 times during the survey and most of them were as loners, and only once a herd with 17 individuals were seen at Virakuthodu. Indirect evidences like presence of dung or hoof marks were located from Poomala, Payampara, Kallichampara, Valiavara, Virakuthodu,

and Mankuzhi (Fig. 6). Highest Occurrence of dung was reported from the moist deciduous forest followed by semi evergreen forests. No dung was located in teak plantations.

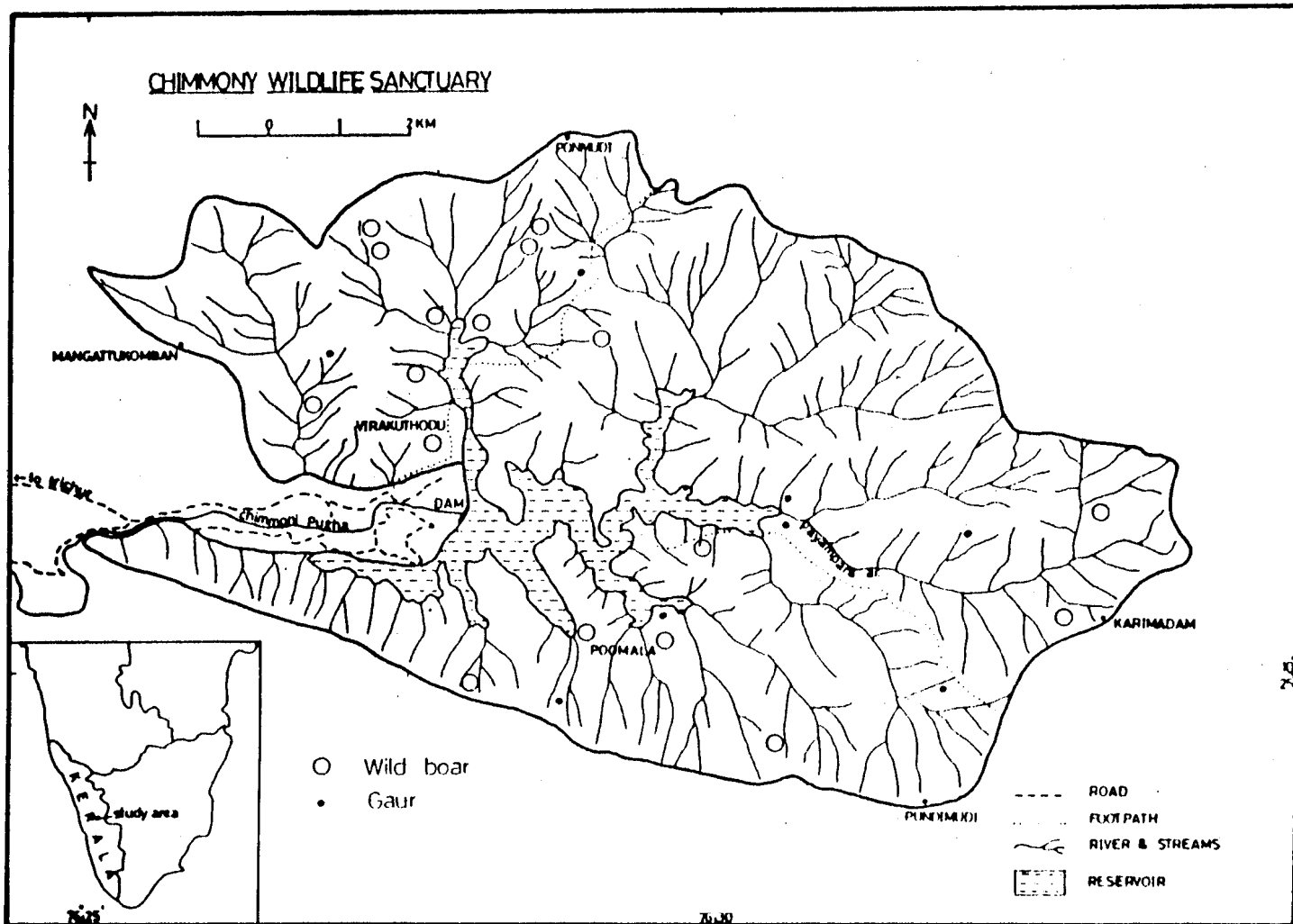
## Sambar

This is the most common deer found in the area and was recorded in all months. Fourteen individuals were sighted during the study and the male to female ratio was 1:2 (n=14). Ramachandran *et al.* (1986) reported a slightly lower male to female ratio of 1:3 (n=104) from Periyar Tiger Reserve. Herd composition varied from 1 to 3 animals. Maximum pellets of sambar was observed in teak plantations followed by moist deciduous forests and semi evergreen forests (Table 9). No significant difference was obtained in the habitat use (Kruskal - Wallis one way analysis of variance). Distribution of sambar is ubiquitous (Fig. 5) and the deer was sighted from places like, Virakuthodu, Poomala, Kadukkappara and Peechikava.

**Table 9 Mean number of pellets of sambar recorded from different habitats at Chimmony Wildlife Sanctuary.**

Months	Habitats		
	Teak plantation	Moist deciduous forest	Semi evergreen forest
January	0.29	0.13	0.06
February	0.37	0.14	0.1
March	3.42	0.13	0.14
April	0.2	0.25	0.15
May	0.2	0.05	0.05
June	0	0	0
July	0.26	0	-
August	0.2	0	-
September	0	0	0
October	0	0	0
November	0.04	0	0.04
December	0	0.13	0.09
Mean	0.16	0.01	0.06





**Fig. 6 Distribution of wild boar and gaur in Chimmony Wildlife Sanctuary**

## **Spotted Deer**

Spotted deer was seen in the drier parts of the sanctuary lying adjacent to the Peechi- Vazhani Wildlife Sanctuary. A total of 38 spotted deer were sighted and the male to female ratio was 1:2 (n=38). This is comparable to the male to female ratio of 1:2 reported from the Satpura National Park (Jayson, 1990) in Madhyapradesh. As the plain areas are limited, herd composition varied from 1 to 20 individuals only. Spotted deer was mostly observed in the sanctuary during the summer months.

## **Other Deer**

Mouse deer and barking deer occur in the sanctuary in very low density. Five mouse deer and four barking deer were sighted in the sanctuary during the period of study. Mouse deer was recorded from Payampara, Virakuthodu and Valiavara. One dead body of mouse deer was also found near Chimmony dam area on 27.7.1994. Cause of the death was not revealed from the specimen. Barking deer were sighted from Virakuthodu and also from Thottapura. Most of them were sighted as loners. Indirect evidences of barking deer were reported mainly from semi evergreen forests followed by teak plantations.

## **Wild Boar**

As in many other forests in Kerala, wild boar was abundant at Chimmony also. Even though the indirect evidences were common, direct sighting at day time was less. A total of 153 wild boar were seen in 30 sightings. Male to female ratio was 1:1 (n=41). Wild Boar inflicts considerable damage to the plantation crops in the surrounding village, Echippara and were found relishing on plantains, pineapple and other annuals and caused heavy economic loss to the cultivators. They were recorded from Kallichampara, Virakuthodu, Thottapura, Poomala, Payampara, Peechikava, Kavala, Valiavara, Namboorikallu, Vavala and Mankuzhi (Fig. 6). Indirect signs of wild boar were recorded equally from the three vegetation types in the summer months (Table

**Table 10 Mean number of pellets of wild boar recorded from different habitats at Chimmony Wildlife Sanctuary.**

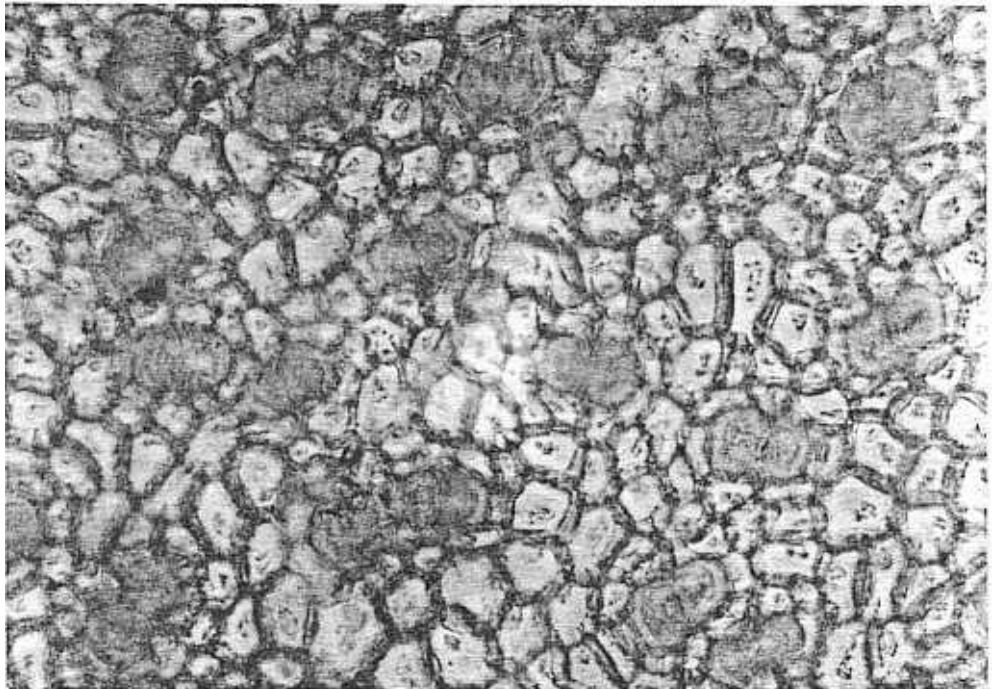
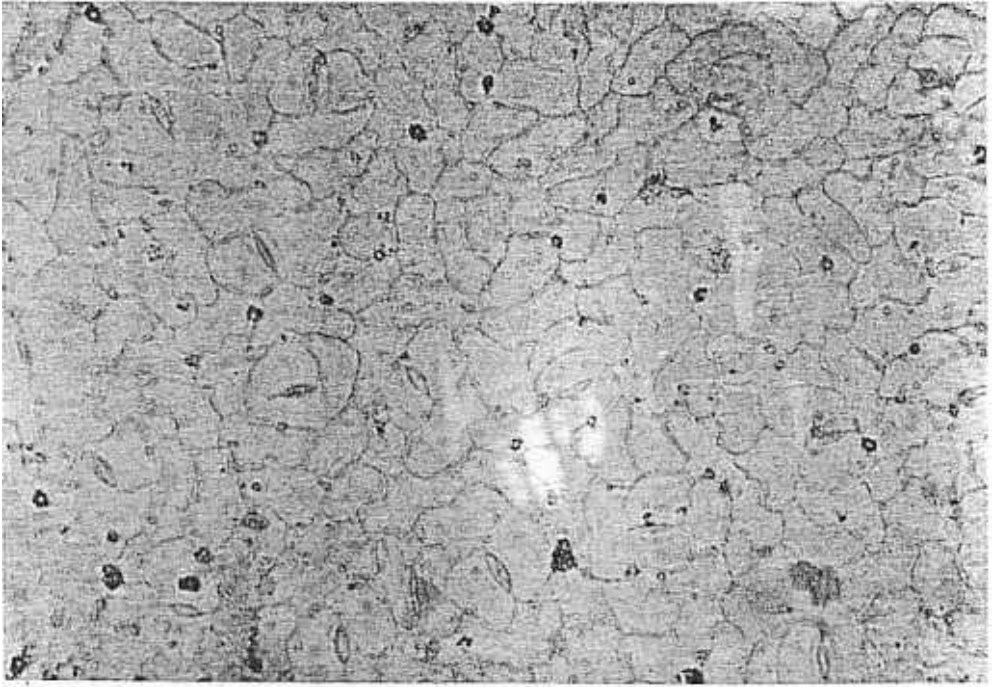
Months	Habitats		
	Teak plantation	Moist deciduous forest	Semi evergreen forest
January	0.01	0	0
February	0.04	0	0.01
March	0.08	0.05	0.01
April	0.1	0.05	0
May	0	0	0
June	0	0	0
July	0	0	
August	0	0	-
September	0	0	0
October	0	0	0
November	0	0	0
December	0.04	0	0
Mean	0.02	0.00	0.00

## **Pangolin**

Indirect evidence of pangolin was recorded four times. Being a nocturnal animal, direct sighting at day time was impossible.

### **4.3. Food and feeding.**

As the density and sighting of herbivores were rare, direct observations on food and feeding behaviour was limited. To overcome this deficiency, indirect way of finding out the food species was tried. Possible food plants belonging to 49 families numbering about 181 species were collected and reference slides of epidermal tissues were prepared (Appendix - II). Photographs of 91 species were also taken and kept ready for reference (Plate 3,4&9. This technique needs some more refinement because only after preparing the

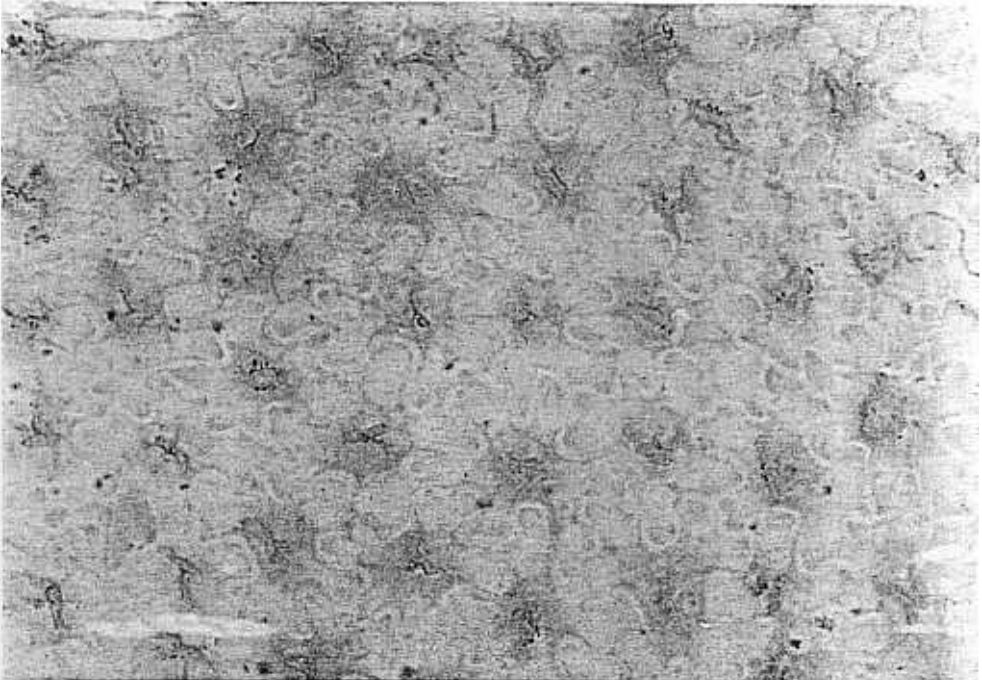


(B)

Plate 3. Epidermal structure of (A) *Ricinus communis* and (B) *Calistemon lanceolatus*.

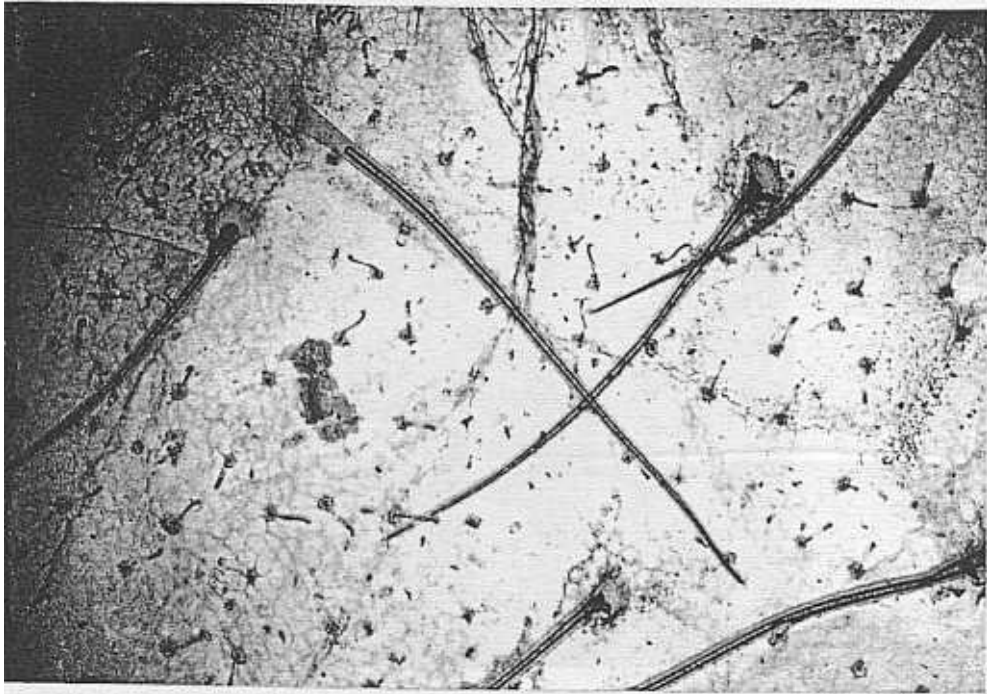


(A)

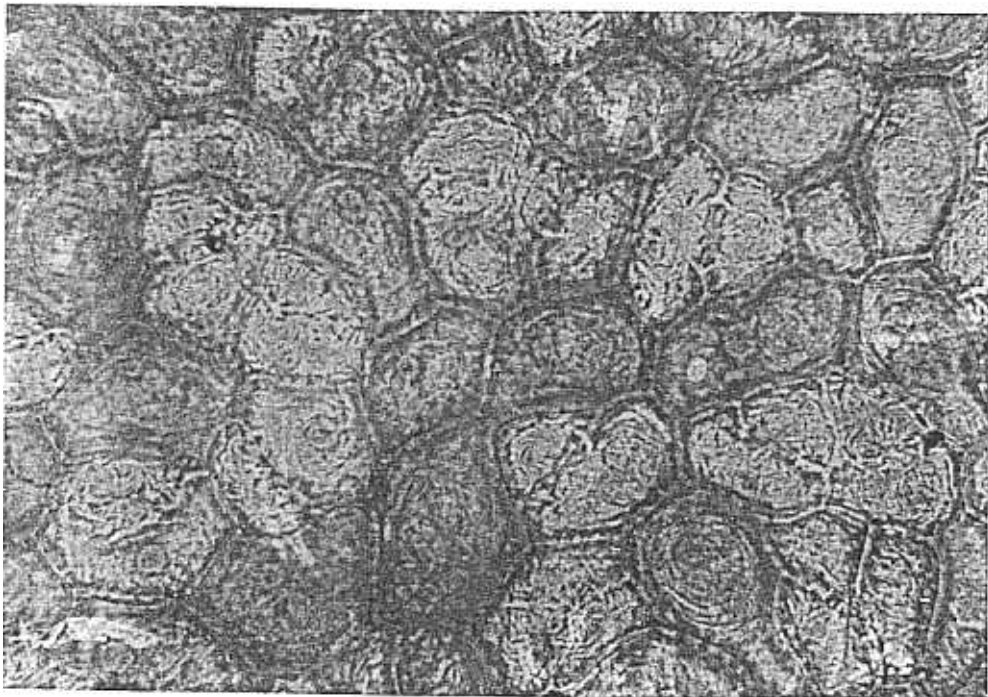


(B)

Plate 4. Epidermal structure of (A) *Ocimum basilicum* and (B) *Biophyllum candoleana*.



(A)



(B)

Plate 5. Epidermal structure of (A) *Desmodium triquetrum* and (B) *Cosmotigima* sp

reference slides of majority of food species found in the area. the identification of all food plants will be successful.

Elephants were feeding on bamboo and reeds as well as bark of *Tectona grandis*, *Terminalia paniculata*, *Trema orientalis* and *Mallotus philippinensis*. Sambar were feeding on *Cassia hirsuta*, *Cyperus* sp., *Desmodium triangulare*, *Chromolena odorata*, *Sida rhombifolia*, *Hemidesmus indicus* and *Mimosa pudica*.

Following plant species were identified from the pellets of sambar using this method namely; *Eleusine indica*, *Mallotus indica*, *Eragrostis riparia*, *Erythrina stricta*, *Ischaemum rangacharianum*, *Leersia hexandra*, *Ochlandra travancorica*, *Paspaluni conjugatum*, *Paspalum scrobiculatum*, *Sporobolus diander*, *Panicum notatum*, *Mariscus pictus* and *Fimbristylis dichotomu*

#### **4.4. Other fauna and tribals**

##### **Reptiles**

Three species of tortoises were recorded from the area namely Indian pond terrapin *Melanochelys trijuga* (Schueigger), Kerala forest terrapin *Heosemys silvatica* (Henderson) and Travancore tortoise *Geochelone travancorica* (Boulenger). Vijaya (1982) has reported *Heosemys silvatica* from the near by Chalakkudy forests.

Indian pond terrapin was seen at Nellippara in the semi- evergreen forest at a height of 800m. It was also observed at Virakuthodu near the reservoir. Kerala forest terrapin was observed at Mangattu Komban in a moist deciduous forest at a height of 855m above MSL. Travancore tortoise was collected from Poomala from the semi evergreen forest from a height of 253m and also from Payampara in the same vegetation but at lower altitude of 281m. Sawscaled - viper *Echis carinatus* (Schneider), cobra *Naja naja* (Linn.) and common green whip snake *Ahaetulla narsutus* (Lacepede) were also recorded during the study.

## **Tribals**

The Malayans were the original inhabitants of the Chimmony area. They were initially staying at Payampara which is inundated presently. In the yesteryears when many of them perished due to infectious diseases they were shifted to a place called Kallichampara. Chickenpox and malaria was prominent during those days and they were again moved to Kallichitra. This was about 4 generations ago. When the Government decided to construct a dam across the Chimmony river in the seventies, they were again dislocated from Kallichitra to the thatched sheds near the dam site.

After much delay, deliberations and agitation they were allotted 7 hectares of land at Nadampadam which is about 18 kms away from the Chimmony. In 1993 January, they were shifted to the new place. But they continue to visit the Chimmony Wildlife Sanctuary for collecting NTFP and fishing.



## **5. DISCUSSION**

### **5.1. Vegetation**

Studies on girth class distribution of trees showed that the semi evergreen forests in Poomala area is comparatively undisturbed than the Virakuthodu area. Number of trees with higher GBH were high at Poomala. As the Virakuthodu area is having moist deciduous forest, valuable timber trees with higher GBH have been removed in the previous selection fellings. Vegetation profile also indicated a typical undisturbed semi evergreen forest at Poomala.

### **5.2. Larger mammals.**

Out of the 47 species of larger mammals reported from the State, 22 species are found in the sanctuary. This include certain rare and endangered species like lion-tailed macaque and tiger. A good population of bonnet macaque also occurs in the sanctuary. Troop size is comparable to that in other areas. Since they inhabit the fringe areas. any disturbance in the natural forest may divert them to crop raiding as happened in other areas (Nair and Balasubramanian, 1985).

As the population of herbivores was very low, it supported only a small carnivore community. Among the rodents, Malabar giant squirrel had a good population, and distributed all along the sanctuary. Being small in area, the elephant population recorded from the sanctuary was not exclusive to this sanctuary. They roamed through the sanctuary and used adjacent areas also. Being highly disturbed and due to the lack of protection, the population of deer species was not dense. Both sambar and spotted deer were less in number. Felling and logging operations currently going on in the sanctuary also has an adverse effect on the herbivore population and most of the natural habitats are disturbed.

### **5.3. Management**

At present all the protection staff is stationed in the western entrance of the sanctuary. The eastern boundaries are virtually unguarded. A rubber nursery is bordering with the Ponmudi boundary. Since these border areas have no field staff stationed permanently, charcoal preparation and even poaching can happen. Karimgayam Kava is an old passage through which people are entering the sanctuary. A guard station with protection staff can be stationed at this entrance. With proper protection to the animals, the area can be developed into a good sanctuary, with a better density of herbivores. This will also increase the tourism potential of the sanctuary.

## 7. REFERENCES

- Ali, S and S.D. Ripley 1983. *Hand Book of the Birds of India and Pakistan*. Bombay nat. Hist. Soc. 737 p.
- Balakrishnan. M and P.S. Easa, 1986. Habitat preferences of larger mammals in the Parambikulam Wildlife Sanctuq. *Biol. Conserv.* 37: 191 - 200.
- Champion. H.G. and S.K. Seth' 1969. *A revised suurvey of the Forest Types of India*. Govt. of India, 404 p.
- George, M.P. 1963 *Working plan for Trichur Division*. Kerala Forest Department.
- Jayson, E.A. 1990. An ecological survey at Satpura National Park. Pachmarhi and Bori Sanctuaries, Madhya Pradesh. *Indian Journal of Forestry* 13(4):280 - 294.
- Kaler. O.P. 1990. *The first management plan for Chimmony Wildlife Sanctuary ( 1990-91 to 1999-2000 )*. Kerala Forest Department 61 p.
- Nair, P.V., K.Balasubramanian 1985. Long - term environmental and ecological impact of multipurpose river valley projects, *Kerala Forest Research Institute Report No. 26,75p*.
- NEST 1992. Birds of Chimmony Wildlife Sanctuq, A survey report. *Nature Education Society, Trichur*. 16p.
- Richards, P.W. 1952. *The Tropical Rain Forest*, Cambridge University Press; New York.
- Ramachandran, K.K; P.Vijayakumaran Nair and P.S. Easa 1986. Ecology of larger mammals of Periyar Wildlife Sanctuary. *J. Bombay nat. Hist. Soc.* 83 (3): 505-524

Rodgers, W.A. and H.S. Panwar 1989. Planning a Wildlife Protected area Network in India. *Wildlife Institute of India*, Dehra Dun. Vol. 1 and 2.

Siegel, S. 1956. *Non parametric Statistics for the Behavioral Sciences*. International student edition. Mac Graw-Hill, Kogakusha Ltd. 312p.

Vijaya, J. 1982. Rediscovery of Forest Cane Turtle *Heosemys (Geoemyda) silvatica* ( Reptilia Testudinata, Emydidae) from Chalakkudy forests in Kerala. *J. Bombay nat. Hist. Soc.* 79(3) : 676 - 677.

## 8. APPENDICES

### Appendix-I Larger mammals sighted at Chimmony Wildlife Sanctuary

Date (m/d/y)	Number	Time	Area	Habitat
<b>Bonnet Macaque</b>				
09/13/93	8(3Y5A)	9.50 AM	Vavala	MDF
11/19/92		11.45 ..	Poomala	SEGF
11/22/92		11.05 ..	Poomala	SEGF
12/04/92	1	12.00 Noon	Poomda	SEGF
12/26/92	5	12.50 PM	Virakuthodu	MDF
12/30/92		11.43 AM	Virakuthodu	MDF
02/28/93	1	3.20 PM	Poomaia	SEGF
02/28/93	10	3.55 PM	Poomala	SEGF
02/07/93	6	9.00 Ah?	Valiavara	SEGF
03/06/93	1	10.10 PM	Thottappura	Teak
03/31/93	1	12.35 PM	Thottappura	Teak
04/30/93	12	8.50 AM	Thottappura	Teak
08/02/93	1	9.15 ..	Poomala	SEGF
08/06/93	6	12.35 PM	Payampara	SEGF
08/07/93	5	9.40 AM	Eetakomban	SEGF
08/12/93	9	11.45 "	Virakuthodu	MDF
08/01/94	8(4A1J1Y)	10.50 "	Poomda	SEGF
08/21/94	10(9A1Y2M)	11.10 "	Virakuthodu	MDF
08/26/94	7(4A2J1Y)	11.05 "	Virakuthodu	MDF
08/31/94	8	1.05 PM	Virakuthodu	MDF
09/11/94	10	11.00 AM	virakuthodu	MDF
09/12/94	7	11.15 "	Nellippara	MDF
09/22/94	7(5A1J1Y)	10.35 "	Poomala	SEGF
09/23/94	8	9.50 "	Virakuthodu	SEGF
09/29/93	8(6A2Y)	11.40 "	Vavala	MDF
09/30/94	5	9.35 "	virakuthodu	MDF
11/12/94	40(8Y11J21A)	12.35 PM	Ponmudi	MDF
11/12/94	7(5A2Y)	8.45 AM	Ponmudi	MDF
11/15/94	16(2Y4J10A)	1.05 PM	Chimmony	Teak
11/16/94	9(1Y2J6A)	9.15 AM	Chimmony	Teak
11/23/94	9(2Y7A)	2.25 PM	Poomala	SEGF
11/24/93	8(1Y2J5A)	11.15 AM	Vavala	SEGF
11/28/94	7(2Y5A)	3.15 PM	virakuthodu	MDF
12/08/94	7(2Y1J4A)	8.46 AM	Poomala	SEGF
12/13/94	10	4.05 PM	Virakuthodu	MDF
12/13/94	9(1Y2J6A)	9.15 AM	Virakuthodu	MDF
12/23/94	11(3Y2J6A)	8.42 AM	virakuthodu	MDF
12/31/94	6(2Y4A)	8.50 AM	Poomaia	SEGF
12/27/94	18(4Y5J9A)	11.48 AM	Poomala	SEGF
01/10/95	14(4Y3J7A)	7.57 AM	virakuthodu	MDF

Y = Young ; J = Juvenile ; A = Adult M = Male ;  
MDF = Moist Deciduous Forest ; SEGF = Semi evergreen Forest.  
Teak = Teak Plantation ; Presence only.

Appendix I contd.

Date (m/d/y)	Number	Time	Area	Habitat
01/12/95	9(1Y2J6A)	7.32 AM	Virakuthodu	MDF
01/12/95	27(4Y8J15A)	10.37 AM	Virakuthodu	MDF
01/16/95	17(3Y3J11A)	7.38 AM	Kadukkapara	MDF
01/17/95	10	10.37 AM	Poomala	SEGF
01/20/95	10	9.57 AM	Poomala	SEGF
01/21/95	10	7.35 "	Payampara	Teak
01/21/95	15	10.20 "	Vavala	MDF
01/22/95	14(3Y3J8A)	11.27 "	Thottappura	MDF
01/25/95	20	7.42 "	Poomala	SEGF
01/27/95	15	9.30 "	Virakuthodu	MDF
01/31/95	1	11.20 "	Kallichampara	SEGF
02/07/95	18(3Y4J11A)	10.30 "	Nellippara	SEGF
02/10/95	10	8.13 "	Virakuthodu	MDF
02/13/95	10	8.20 "	Kadukkapara	
02/15/95	14(4Y2J8A)	9.42 "	Poomala	SEGF
02/25/95	10(2Y2J6A)	10.05 "	Virakuthodu	MDF
03/15/95	1	1.07 PM	Kallichampara	SEGF
03/17/95	14(2Y3J9A)	8.25 AM	Poomala	SEGF
03/21/95	10	11.22 AM	Poomala	SEGF
03/22/95	14(3Y5J6A)	8.42 "	Poomala	SEGF
03/24/95	6	8.58 "	Vavala	SEGF
03/27/95	10	9.22 "	Poomala	SEGF

**Nilgiri Langur**

09/13/92	2	10.40 AM	Vavala	MDF
03/16/93	1	9.55 AM	Thottappura	Teak
04/18/93	1	5.45 PM	Thottappura	Teak
01/30/93	1	9.01 AM	Thottappura	Teak
04/30/93	1	7.10 "	Thottappura	Teak
05/15/93	1	7.55 "	Virakuthodu	Teak
08/07/93	1	9.40 "	Eettakomban	MDF
01/13/95	5	10.40 AM	Virakuthodu	MDF
01/25/95	5	9.16 AM	Kallichampara	SEGF
01/27/95	10	8.07 AM	virakuthodu	MDF
02/07/95	10	8.45 AM	Nellippara	SEGF

**Malabar Giant Squirrel**

09/13/92	2	9.35 AM	Vavala	MDF
11/10/92	1	3.58 PM	Virakuthodu	SEGF
11/10/92	1	10.10 AM	Virakuthodu	SEGF
11/11/92	1	9.45 "	Payampara	MDF
11/11/92	1	8.44 "	Payampara	MDF
11/12/92	1	3.00 PM	Payampara	MDF

Appendix 1 contd.

Date (m/d/y)	Number	Time	Area	Habitat
11/1 1192	1	10.32 "	Payampara	MDF
11/17/92	1	8.20 AM	Poomala	SEGF
11/17/92	1	9.13 AM	Poomala	SEGF
11/18/92	1	1.53 PM	Virakuthodu	SEGF
11/18/92	1	3.05 PM	Virakuthodu	SEGF
11/20/92	1	11.02 AM	Kallichampara	SEGF
11/20/92	1	9.25 "	Kallichampara	MDF
11/20/92	1	7.57 "	Kallichampara	MDF
11/20/92	1	8.03 "	Kallichampara	MDF
11/20/92	1	12.59 PM	Kallichampara	SEGF
11/22/92	1	9.40 AM	Poomala	MDF
12/04/92	1	9.25 "	Poomala	SEGF
12/19/92	1	11.20 "	Virakuthodu	MDF
12/30/92	1	11.30 "	virakuthodu	MDF
01/15/93	1	10.15 AM	Cheriavara	SEGF
01/26/93	1	11.00 "	virakuthodu	MDF
01/27/93	1	5.20 PM	Poomala	SEGF
01/28/93	1		Virakuthodu	MDF
02/05/93	1	8.30 AM	Poomala	SEGF
02/13/93	1	1.30 PM	Virakuthodu	MDF
02/20/93	2	8.05 AM	Virakuthodu	SEGF
03/16/93	2	9.55 "	Thottappura	Teak
03/27/93	1	7.06 "	Thottappura	Teak
03/23/93	1	10.50 "	Thottappura	Teak
03/22/93	1	11.30 "	Thottappura	Teak
01/29/93	1	10.30 "	Thottappura	Teak
04/29/93	1	9.00 "	Thottappura	Teak
04/29/93	1	9.55 "	Thottappura	Teak
04/30/93	1	7.50 "	Thottappura	Teak
05/06/93	1	5.45 PM	Virakuthodu	MDF
07/1 1/93	1	10.40 AM	Payampara	SEGF
08/02/93	1	8.45 "	Poomala	SEGF
08/02/93	1	10.43 "	Poomala	SEGF
08/02/93	1	2.35 PM	Poomala	SEGF
08/05/93	1	10.24 "	Virakuthodu	MDF
08/06/93	1	12.05 AM	Payampara	SEGF
08/07/93	1	11.47 AM	Eettakomban	SEGF
08/1 1/93	1	12.00 AM	Payampara	SEGF
08/12/93	1	10.25 AM	Virakuthodu	MDF
08/13/93	1	9.45 "	Virakuthodu	MDF
08/14/93	1	8.45 "	Poomala	SEGF
08/13/94	1	10.10 "	Virakuthodu	MDF
08/26/94	2	12.12 "	Virakuthodu	MDF
09/06/94	2	10.50 "	Poomala	SEGF
09/12/94	1	11.45 "	Nellippara	MDF

## Appendix I contd.

Date (m/d/y)	Number	Time	Area	Habitat
09/14/94	2	11.30"	Virakuthodu	MDF
09/22/94	2	11.20"	Poomala	SEGF
09/23/94	1	10.30"	Virakuthodu	SEGF
09/27/94	1	12.45 PM	Virakuthodu	SEGF
09/28/94	2	11.55 AM	Vavala	MDF
09/28/94	2	11.40 AM	Vavala	MDF
09/29/94	2	11.10 AM	Vavala	MDF
09/29/94	2	12.15 PM	Vavala	MDF
09/29/94	2	12.05 A ??	Vavala	MDF
09/30/94	2	10.40"	Virakuthodu	MDF
11/10/94	1	11.40"	Virakuthodu	MDF
11/12/94	1	10.35 AM	Ponmudi	MDF
11/12/94	1	11.00"	Ponmudi	MDF
11/16/94	2	11.40"	Thottappura	MDF
11/18/94	1	12.05 AM	Poomala	SEGF
11/20/94	1	10.15 AM	Poomala	SEGF
11/20/94	1	10.40"	Poomala	SEGF
11/20/94	1	11.30"	Poomala	SEGF
11/20/94	1	11.20"	Poomala	SEGF
11/21/94	1	11.55 "	Payampara	MDF
11/22/94	1	9.25 "	Poomala	SEGF
11/22/93	1	10.15"	Poomala	SEGF
11/23/94	1	11.50"	Poomala	SEGF
11/23/93	1	8.55 "	Chimmony	Teak
11/24/94	1	9.35 "	Vavala	SEGF
11/27/94	1	10.30 AM	Poomala	SEGF
11/29/94	1	11.55 "	Poomala	SEGF
12/07/94	1	12.15"	Poomala	SEGF
12/08/94	1	9.40 "	Payampara	SEGF
12/08/94	1	8.15 "	Poomala	SEGF
12/08/94	1	9.00 "	Poomala	SEGF
12/12/94	1	9.42 "	Virakuthodu	MDF
12/17/93	1	11.27 "	Ponmudi	MDF
12/18/94	1	10.02"	Ponmudi	MDF
12/18/94	1	10.47"	Poomala	SEGF
12/18/94	1	12.18"	Poomala	SEGF
12/18/93	1	8.52 "	Ponmudi	MDF
12/19/94	1	9.52 "	Kallichampara	SEGF
12/21/94	2	9.50 "	Kallichampara	SEGF
12/22/94	1	9.12"	Virakuthodu	SEGF
12/27/94	1	11.15"	Poomala	SEGF
12/29/94	2	11.23"	Poomala	SEGF
12/29/94	1	8.33 "	Poomala	SEGF
12/29/94	1	9.00 "	Poomala	SEGF
12/30/94	1	10.03"		SEGF



## Appendix 1 contd.

Date (m/d/y)	Number	Time	Area	Habitat
12/30/93	1	10.25 "	Virakuthodu	SEGF
12/31/94	1	11.10"	Poomala	SEGF
12/31/94	1	8.48"	Poomala	SEGF
01/04/95	1	6.15 AM	Vellichamukku	MDF
01/04/95	1	7.30 "	Virakuthodu	MDF
01/04/95	1	9.15 "	Virakuthodu	MDF
01/01/95	1	9.53 "	Virakuthodu	MDF
01/13/95	1	10.07 "	Virakuthodu	MDF
01/13/95	1	10.32 "	Virakuthodu	MDF
01/13/95	3	7.35 "	Virakuthodu	MDF
01/13/95	1	8.28 AM	Virakuthodu	MDF
01/13/95	1	8.38 AM	Virakuthodu	MDF
01/14/95	1	3.35 PM	Virakuthodu	MDF
01/15/95	1	8.20 AM	Payampara	MDF
01/15/95	1	9.33 AM	Payampara	MDF
01/16/95	1	9.48 "	Kadukkapara	MDF
01/17/95	1	10.32 "	Poomala	SEGF
01/17/95	1	10.52 AM	Poomala	SEGF
01/21/95	1	7.22 AM	Payampara	Teak
01/21/95	1	9.08 AM	Payampara	Teak
01/21/95	1	3.12 PM	Virakuthodu	MDF
01/22/95	2	8.39 AM	Thottappura	Teak
01/22/95	1	9.36 "	Thottappura	MDF
01/23/95	1	11.02 "	Virakuthodu	MDF
01/25/95	1	8.30"	Poomala	SEGF
01/25/95	2	9.15"	Kallichampara	SEGF
01/25/95	1	10.53"	Kallichampara	SEGF
01/26/95	1	9.42"	Poomala	SEGF
01/26/95	1	7.15 "	Virakuthodu	MDF
01/27/95	1	8.10 AM	Virakuthodu	MDF
01/27/95	2	8.10 AM	Virakuthodu	MDF
01/28/95	1	4.42 PM	Virakuthodu	MDF
01/28/95	1	5.12 PM	Poomala	SEGF
01/31/95	1	7.20 AM	Kallichampara	SEGF
01/31/95	1	7.50 "	Kallichampara	SEGF
01/31/95	1	8.23 "	Kallichampara	SEGF
02/08/95	1	7.37 "	Virakuthodu	MDF
02/08/95	1	7.50 "	virakuthodu	MDF
02/09/95	1	10.47"	Virakuthodu	MDF
02/09/95	1	9.42 "	Virakuthodu	MDF
02/09/95	1	8.13 "	Virakuthodu	MDF
02/10/95	1	8.24 "	Virakuthodu	MDF
02/10/95	1	10.22 "	Virakuthodu	MDF
02/11/95	1	9.45 "	Kadukkapara	MDF
02/13/95	1	9.52	Poomala	SEGF

## Appendix I contd.

Date (m/d/y)	Number	Time	Area	Habitat
02/14/95	1	8.14 AM	Poomala	SEGF
02/15/95	1	8.43 AM	Poomala	SEGF
02/15/95	2	9.27 AM	Poomala	SEGF
02/16/95	1	9.60 "	Virakuthodu	SEGF
02/16/95	1	12.05 Noon	Virakuthodu	SEGF
02/17/95	1	9.02 AM	Payampara	MDF
02/17/95	1	11.17 "	Payampara	MDF
02/18/95	1	8.02 "	Virakuthodu	MDF
02/18/95	1	11.11 "	Virakuthodu	MDF
02/20/95	1	10.25 "	virakuthodu	MDF
02/21/95	1	7.58 AM	Poomala	SEGF
0/22/95	2	9.05 "	Poomala	SEGF
02/21/95	1	9.14 "	Poomala	SEGF
02/21/95	1	10.38 "	Poomala	SEGF
02/21/95	1	11.55 AM	Poomala	SEGF
02/22/95	2	10.05 AM	Poomala	SEGF
02/22/95	2	10.05 AM	Poomala	SEGF
02/22/95	1	11.42 "	Poomala	SEGF
02/23/95	1	8.58 "	Virakuthodu	SEGF
02/23/95	1	8.58 "	Virakvthodu	SEGF
02/23/95	1	8.12 "	Payampara	SEGF
02/24/95	1	10.18 "	Payampara	SEGF
02/25/95	1	8.35 "	Virakvthodu	MDF
02/27/95	1	10.55 "	Virakuthodu	MDF
03/07/95	1	10.10 "	Virakvthodu	MDF
03/08/95	2	10.36 "	virakuthodu	MDF
03/09/95	2	8.45 "	Virakuthodu	MDF
03/10/95	1	8.33 "	Kavala	MDF
03/10/95	1	11.07 "	Kavala	MDF
03/10/95	1	6.10 AM	Virakuthodu	MDF
03/11/95	1	7.47 "	Virakuthodu	MDF
03/11/95	1	8.13 "	Virakuthodu	MDF
03/11/95	1	8.49 "	Virakuthodu	MDF
03/12/95	1	6.42 "	Virakuthodu	MDF
03/15/95	1	11.00 "	Kallichampara	SEGF
03/17/95	2	8.07 "	Poomala	SEGF
03/20/95	1	9.20 "	Poomala	SEGF
03/21/95	1	8.50 "	Poomala	SEGF
03/21/95	1	9.22 "	Poomala	SEGF
03/22/95	1	9.37 "	Poomala	SEGF
03/24/95	1	9.25 "	Vavala	SEGF
03/24/95	2	10.42 "	Vavala	SEGF
03/25/95	1	9.37 "	Mankuzhi	MDF
03/27/95	1	10.08 "	Poomala	SEGF
03/27/95	1	10.16 "	Poomala	SEGF

Appendix I contd.

Date (m/d/y)	Number	Time	Area	Habitat
03/28/95	1	7.45 "	Namboorikavala	SEGF
03/28/95	1	9.05 "	Namboorikavala	MDF
03/30/95	1	8.12 "	Virakuthodu	MDF
03/31/95	1	9.30 AM	Virakuthodu	MDF

**Three Striped Palm Squirrel**

11/17/92	1	9.58 AM	Poomala	SEGF
11/17/92	1	9.58 "	Poomala	SEGF
12/13/92	1	9.24 "	virakuthodu	MDF
12/13/92	1	9.24 "	Virakuthodu	MDF
02/10/93	1	12.15"	Virakuthodu	MDF
02/10/93	1	12.15"	Virakuthodu	MDF
05/11/93	1	5.14 PM	Virakuthodu	MDF
05/11/93	1	5.14 PM	Virakuthodu	
08/14/93	1	12.25 AM	Poomala	SEGF
08/14/93	1	12.25 AM	Poomala	SEGF
11/14/94	1	12.00 Noon	Kidkkappara	MDF
11/18/94	1	2.35 PM	Poomala	SEGF
11/21/94	1	11.35 AM	Payampara	MDF
11/21/94	1	2.35 PM	Payampara	MDF
11/24/94	1	10.05 AM	Vavala	SEGF
11/26/94	1	8.45 "	Virakuthodu	MDF
11/26/94	1	9.15 "	Chimmony	Teak
11/28/94	1	11.00"	Virakuthodu	MDF
11/29/94	1	9.30 "	Poomala	SEGF
11/14/94	1	12.00 Noon	Kidkkappara	MDF
11/18/94	1	2.35 PM	Poomala	SEGF
11/21/94	1	11.35 AM	Payampara	MDF
11/21/94	1	2.35 PM	Payampara	MDF
11/24/93	1	10.05 AM	Vavala	SEGF
11/26/94	1	8.45 "	Virakuthodu	MDF
11/26/94	1	9.15 "	Chimmony	Teak
11/28/94	1	11.00"	Virakuthodu	MDF
11/29/94	1	9.30 "	Poomala	SEGF
12/08/94	1	12.20"	Payampara	SEGF
12/08/94	1	1.50 PM	Payampara	SEGF
12/09/94	1	2.05 "	Virakuthodu	MDF
12/12/93	1	8.45 AM	virakuthodu	MDF
12/14/94	1	12.00 Noon	Virakuthodu	MDF
12/18/94	1	8.56 AM	Ponmudi	MDF
12/18/94	1	10.23"	Poomala	SEGF
12/19/94	1	10.37"	Kallichampara	SEGF
12/21/94	1	1.18 PM	Kallichampara	SEGF

Appendix I contd

Date (m/d/y)	Number	Time	Area	Habitat
12/27/94	2	10.35AM	Poomala	SEGF
12/30/94	1	9.50 AM	Virakuthodu	SEGF
12/08/94	1	12.20"	Payampara	SEGF
12/08/94	1	1.50 PM	Payampara	SEGF
12/09/94	1	2.05 "	virakuthodu	MDF
12/12/94	1	8.45 AM	virakuthodu	MDF
12/14/94	1	12.00"	Virakuthodu	MDF
12/18/94	1	8.56 "	Ponmudi	MDF
12/18/94	1	10.23"	Poomala	SEGF
12/19/94	1	10.37"	Kallichampara	SEGF
12/21/94	1	1.18PM	Kallichampara	SEGF
12/27/94	2	10.35AM	Poomala	SEGF
12/30/94	1	9.50 "	virakuthodu	SEGF
01/04/95	1	10.54"	virakuthodu	MDF
01/04/95	1	7.42 AM	Virakuthodu	MDF
01/04/95	1	10.54 "	Virakuthodu	MDF
01/10/95	1	4.58 PM	Virakuthodu	MDF
01/10/95	1	4.58 PM	Virakuthodu	MDF
01/21/95	1	10.40 AM	Vavala	MDF
01/25/95	1	9.02 "	Kallichampara	SEGF
01/21/95	1	10.40 AM	Vavala	MDF
01/35/95	1	9.02 "	Kallichampara	SEGF
01/28/95	1	4.53 PM	Poomala	SEGF
01/28/95	1	4.53 PM	Poomala	SEGF
01/30/95	1	10.05 AM	Poomala	SEGF
01/31/95	1	11.57 "	Kallichampara	SEGF
01/30/95	1	10.05 AM	Poomala	SEGF
01/31/95	1	11.57 AM	Kallichampara	SEGF
02/08/95	1	7.57 "	virakuthodu	MDF
02/08/95	1	9.20 "	Virakuthodu	MDF
02/08/95	1	7.57 "	Virakuthodu	MDF
02/08/95	1	9.20 "	virakuthodu	MDF
02/11/95	1	9.45 "	Kadukkapara	MDF
02/11/95	1	9.45 "	Kadukkapara	MDF
02/14/95	1	8.05 "	Poomala	SEGF
02/14/95	1	8.05 "	Poomala	SEGF
02/17/95	1	11.48"	Payampara	MDF
02/17/95	1	11.48"	Payampara	MDF
02/18/95	1	8.13 "	Virakuthodu	MDF
02/18/95	1	8.13 "	Virakuthodu	MDF
02/20/95	1	10.17"	Virakuthodu	MDF
02/20/95	1	10.17"	Virakuthodu	MDF
02/21/95	1	9.08 "	Poomala	SEGF
02/21/95	1	9.08 "	Poomala	SEGF
02/25/95	1	9.28 "	virakuthodu	

## Appendix I contd.

Date (m/d/y)	Number	Time	Area	Habitat
02/25/95	1	9.28 "	virakuthodu	MDF
03/07/95	1	7.52 "	Virakuthodu	MDF
03/07/95	1	7.52 "	Virakuthodu	MDF
03/10/95	1	8.57 "	Kavala	MDF
03/10/95	1	11.28"	virakuthodu	MDF
03/10/95	1	8.57 "	Kavala	MDF
03/10/95	1	11.28 AM	Virakuthodu	MDF
03/17/95	1	7.35 "	Poomala	SEGF
03/17/95	1	7.35 "	Poomala	SEGF
03/28/95	1	11.18"	Namboorikavala	MDF
03/28/95	1	11.18 AM	Namboorikavala	MDF
03/30/95	1	7.12 "	Virakuthodu	MDF
03/30/95	1	7.12 AM	Virakuthodu	MDF
09/03/95	1	7.52 "	virakuthodu	
09/03/95	1	7.52 "	Virakuthodu	MDF

### Blacknaped Hare

08/09/93	1	9.05 AM	Valiavara	MDF
09/10/93	1	1.05 PM	Virakuthodu	MDF
12/27/94	1	10.42 AM	Poomala	SEGF
01/21/95	1	9.10 AM	Payampara	Teak
01/30/95	1	12.32 PM	Peechikava	SEGF
02/10/95	1	10.08 AM	Virakuthodu	MDF
02/22/95	1	8.15 "	Poomala	SEGF
03/12/95	1	6.23 "	Virakuthodu	Teak
03/20/95	1	9.28 AM	Poomala	SEGF

### Elephant

02/20/93	2	8.00 AM	Virakuthodu	SEGF
09/09/94	5		Nellippara	MDF
11/23/94	5(1YIM3F)	9.40 AM	Poomala	SEGF
02/13/95	5(1Y3A)	10.05 AM	Poomala	SEGF
03/10/95	4	8.38 AM	Virakuthodu	MDF
03/15/95	6	2.15 PM	Payanpara	SEGF

### Gaur

05/15/93	17	7.55 AM	Virakuthodu	
11/16/94	1	11.55"	Thottappura	MDF
11/26/94	1	10.00"	Virakuthodu	MDF
11/28/94	1	2.10 "	Virakuthodu	MDF
02/22/95	1	10.45 AM	Poomala	SEGF

Appendix 1 contd.

Date (m/d/y)	Number	Time	Area	Habitat
<b>Sambar</b>				
11/20/94	1	11.40 AM	Poomala	SEGF
12/08/94	1	9.15 "	Poomala	SEGF
12/30/94	1M	10.07 "	Virakuthodu	SEGF
01/16/95	1	11.07 AM	Kadukkapara	MDF
01/20/95	2(1MIF)	11.40 AM	Poomala	SEGF
01/24/95	1(Y)	11.20"	Poomala	SEGF
01/27/95	2F	10.37"	Virakuthodu	MDF
01/30/95	1F	11.07 "	Peechikava	SEGF
02/11/95	1	8.57 "	Kadukkapara	MDF
02/16/95	1	4.54 PM	Virakuthodu	SEGF
03/07/95	1	8.35 AM	Virakuthodu	MDF
03/12/95	1	8.00 AM	Virakuthodu	MDF
<b>Barking Deer</b>				
12/03/92	1	3.10 PM	Virakuthodu	MDF
04/30/93	1	7.21 AM	Thottappura	Teak
05/02/93	1	7.50 AM	Virakuthodu	MDF
02/20/95	1	11.32 AM	Virakuthodu	MDF
<b>Wild Boar</b>				
11/11/92	5	1.40PM	Payampara	MDF
11/18/92	1	2.50 PM	Virakuthodu	SEGF
11/20/92	10	8.17 AM	Kallichampara	MDF
02/07/93	1	8.50 AM	Valiavara	Teak
02/19/93	1	1.10PM	Nellikoinnan	MDF
02/20/93	7	3.15 PM	Payampara	MDF
02/28/93	7	4.17 PM	Poomala	SEGF
04/24/93	16	6.30 PM	Thottappura	TEAK
05/15/93	3	8.55 AM	Virakuthodu	MDF
08/11/93	8	1.25 PM	Payampara	SEGF
09/27/94	1	2.48 "	Virakuthodu	SEGF
09/28/94	5	10.15 AM	Vavala	Teak
11/16/93	2	11.10 AM	Thottappura	MDF
12/09/94	8	1.18 PM	Virakuthodu	SEGF
12/13/94	1	12.12 AM	Virakuthodu	MDF
01/12/95	4	7.05 AM	Virakuthodu	MDF
01/25/95	2	8.58 AM	Poomala	SEGF
01/25/95	1	9.41 "	Kallichampara	SEGF
01/25/95	22(2Y4A16J)	10.15 "	Kallichampara	SEGF
01/30/95	1	11.48 "	Peechikava	SEGF

Appendix I contd.

Date (m/d/y)	Number	Time	Area	Habitat
02/09/95	1	9.50 "	Virakuthodu	MDF
02/10/95	1	10.35"	Virakuthodu	MDF
02/23/95	<b>2</b>	8.52 AM	Virakuthodu	SEGF
03/07/95	14/8A3Y3J	9.10 PM	Virakuthodu	MDF
03/10/95	4	10.37 AM	Kavala	MDF
03/11/95	6	9.48 "	Virakuthodu	MDF
03/11/95	1	11.32"	Virakuthodu	MDF
<b>03/12/95</b>	1	6.42 PM	Virakuthodu	MDF
03/25/95	1	7.45 AM	Mankuzhi	MDF
03/28/95	16(6Y4J6)	10.23"	Namboorikavala	SEGF

Y = Young ; J = Juvenile ; A = Adult M = Male ;

MDF = Moist Deciduous Forest ; SEGF = Semi evergreen Forest.

Teak = Teak Plantation ; Presence only.

## Appendix: \* II List of plants for which reference slides were prepared

### Family : Ranunculaceae

*Naravelia zeylanica*

### Family : Polygalaceae

*Xanthophyllum flavescens*

### Family : Malvaceae

*Sida cordifolia*  
*Abutilon sp.*  
*Bombax ceiba*

### Family : Tiliaceae

*Grewia riliaefolia*  
*Triumfetta pilosa*

### Family : Elaeocarpaceae

*Elaeocarpus glandulosus*  
*Elaeocarpus tuberculatus*

### Family : Geraniaceae

*Biophytum candolleianum*  
*Impatiens*

### Family : Rutaceae

*Toddalia asiatica*

### Family : Burseraceae

*Garuga pinnata*

### Family : Meliaceae

*Cedrela sp.*  
*Naragamia alata*

### Family : Rhamnaceae

*Zizyphus jujuba*  
*Zizyphus rugosa*

### Family : Vitaceae

*Tetrastigma sulcatum*  
*Leea sp.*  
*Leea wightii*

### Family : Sapindaceae

*Harpullia arborea*  
*Allophylus rheedii*  
*Cardiospermum halicacabu*  
*Allophylus serratus*

### Family : Anacardiaceae

*Solenocarpus indicus*

### Family : Papilionaceae

*Desmodium gyrans*  
*Desmodium triangulare*  
*Desmodium sp.*  
*Desmodium triquetrum*  
*Desmodium ormocarpoides*  
*Crotalaria indica*  
*Crotalaria walkeri*  
*Enthrina stricta*  
*Ciitoria tematea*

### Family : Mimosaceae

*Mimosa pudica*  
*Albizia iebbeck*  
*Prosopis specigera*  
*Prosopis cinergria*

### Family : Combretaceae

*Calycopteris floribunda*

### Family : Myrtaceae

*Eugenia jambos*  
*Syzigium sp.*

### Family : Passifloraceae

*Passiflora foetida*



Appendix - II contd.

**Family : Rubiaceae**

*Ixora brachiata*  
*Ixora coccinea*  
*Mussaenda glabrata*  
*Anotis wightiana*  
*Knoxia sp.*  
*Oldenlandia conmbosa*  
*Spermacoce latifolia*  
*Psychotria sp.*  
*Hedyotis auriculana*  
*Myrtocarpus verticillatus*  
*Xeromphis spinosa*

**Family : Compositae**

*Aegeratum sp.*  
*Acantospermum hispidu*  
*Elephantopus scaber*  
*Eupatorium odoratum*  
*Eupatorium odoratum*  
*Eupatorium odoratum*  
*Synedrella nodiflora*  
*Tridax sp.*  
*Bidens pilosa*  
*Vernonia sp.*  
*Vernonia cineraria*  
*Lactuca sp.*

**Family : Myrsinaceae**

*Maesa indica*

**Family : Oleaceae**

*Olea dioica*

**Family : Apocynaceae**

*Alstonia scholaris*  
*Rauwolfia sp.*  
*Vitex negundo*  
*Gmelena arborea*

**Family : Asclepiadaceae**

*Cosmostigma sp.*  
*Hemidesmus indicus*  
*Hyptis sp.*

**Family : Convolvulaceae**

*Impmea alba*  
*Ipomea hederifoli*  
*Evolvulus*

**Family : Solanaceae**

*Solanum torvum*  
*Cestrum nocturnum*

**Family : Scrophulariaceae**

*Scoparia dulcis*

**Family : Gesneriaceae**

*Rhycoglossum notonianum*

**Family : Acanthaceae**

*Tridax procumbens*  
*Strobilanthes anceps*  
*Strobilanthes sp.*

**Family : Verbenaceae**

*Clerodendron infortunatum*  
*Clerodendron thomsoni*  
*Lantana camara*  
*Duranta plumeri*

**Family: Labiatae**

*Ocimum bacilicum*

**Family : Amaranthaceae**

*Gompherena decumbens*  
*Aerva lanata*  
*Banalia thyrifoli*  
*Rauwolfia serpenti*

**Family : Polygonaceae**

*Polygonum chinense*

Appendix -II contd.

**Family : Myristicaceae**

*Knema attenuata*

**Family : Lauraceae**

*Litsea* sp.

*Litsea coriacea*

*Cinnamomum zeylanicum*

*Cinnamomum riparium*

**Family : Euphorbiaceae**

*Macaranga peltata*

*Macaranga indica*

*Euphorbia hirta*

*Ricinus communis*

*Antidesma acidum*

*Phyllanthus* sp.

*Mallotus indica*

*Mallotus* sp.

*Bridelia scandens*

*Drypetes* sp.

*Glochidion* sp.

*Sauropus* sp.

*Brynia rhamnoides*

**Family : Moraceae**

*Ficus* sp.

**Family: Urticaceae**

*Laportea* sp.

*Pouzolzia indica*

**Family : Gnetaceae**

*Gnetum ula*

**Family : Cycadaceae**

*Cycas* sp.

**Family : Zingiberaceae**

*Costus speciosus*

*Alpinia galanga*

*Amomum* sp.

*Globba bulbifera*

*Globba ophioglossa*

*Zingiber* sp.

*Zingiber macrostachyum*

**Family : Dioscoriaceae**

*Dioscorea oppositifolia*

*Dioscorea pentaphylla*

**Family : Liliaceae**

*Asparagus* sp.

*Gloriosa superba*

**Family : Commelinaceae**

*Commelina bengalensis*

**Family : Palmaceae**

*Calamus rotang*

*Caryota urens*

**Family : Araceae**

*Pothos scandens*

**Family : Cyperaceae**

*Cyperus pilosus*

*Cyperus kyllingia*

*Cyperus distans*

*Mariscus pictus*

*Fimbristylis dichotoma*

*Scleria corymbosa*

**Family : Gramineae**

*Saccharum officinarum*

*Centotheca lappacea*

*Ochlandra travancorica*

*Paspalum scrobiculatum*

*Paspalum conjugatum*

*Paspalidium flavidum*

*Cyrtococcum oxyphyllum*

*Cyrtococcum patens*

*Cyrtococcum decarens*

*Bothriochloa* sp.

*Cappellidium* sp.

*Leersia hexandra*

*Cenchrus inhiri*

*Briza minor*

*Bambusa* sp.

*Sporobolus diander*

**Appendix - II contd.**

**Family : Gramineae (contd.)**

*Eragrostis riparia*  
*Chloris* sp.  
*Eleusine* sp.  
*Paspalidium punctatum*  
*Perotis indica*  
*Arundinella mesophylla*  
*Rottboellia cochinchinensis*  
*Euteropogan dolichostachya*  
*Oplismenus compositus*  
*Ischaemum rangacharianum*  
*Dactyloctenium aegyptium*  
*Digitaria ciliaris*

*Chrysopogon* sp.  
*Digitaria* sp.  
*Digitaria griffithii*  
*Saccharum* sp.  
*Apluda* sp.  
*Eragrostis tenuifolia*  
*Eragrostis unioloides*  
*Cymbopogon flexuosus*  
*Axonopus compressus*  
*Chnsopogon*  
*Panicum* sp.