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MONITORING BIODIVERSITY IN SELECTED LANDSCAPES IN THE KERALA PART OF WESTERN GHATS

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(Final Report of the project KFRI/372/2001; April 2001-March 2003)

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Abstract of Project Proposal

1. Project No. : KFRI/372/2001
2. Title of the project : Monitoring biodiversity in selected landscapes in the Kerala part of Western Ghats.
3. Objectives : i. Monitoring of selected target species in different locations in the Kerala part of Western Ghats involving teachers and students from five selected colleges in the State and thereby establishing a network for comparison.
   ii. Extending training in inventorying and monitoring biodiversity.
4. Date of commencement: April 2001
5. Scheduled date of completion: March 2003
6. Project team
   Principal Investigator : Dr. J.K.Sharma
   Associate : Dr. P.S. Easa (Till Feb. 2004)
   : Dr. George Mathew (From Feb. 2004)
7. Study area : Kerala part of Western Ghats
8. Duration of study : Two years
9. Project budget : Rs. 4,60,000
10. Funding Agency : STEC

ABSTRACT

Biodiversity of selected landscapes at five different locations was studied with the active participation of college teachers and students. Cheruvathur Grama Panchayath (Nehru College, Kanhangad); Muthur (MES College, Valanchery); Paliyamangalam, Ayilamudichi Hills, Nemmara (NSS College, Nemmara): Karoor Grama Panchayath (St. Thomas College, Palai) and Pramadom Grama Panchayath (Catholicate College, Pathanamthitta) were the areas covered in this study with the assistance of local colleges indicated in parenthesis.

In the case of Cheruvathur Grama Panchayath, the study was carried out in different habitats such as lateritic plateau, sacred groves, rice fields and human settlements. The floristic study was confined to angiosperms. A total of 295 species of plants, coming under 239 genera, spread over 82 families were recorded. Trees, shrubs, herbs, climbers and epiphytes were common in the study area. The family Fabaceae with 36 species showed high degree of diversity followed by Rubiaceae. The flora contained a high proportion of medicinal plants such as *Tinospora cordifolia* (Chittamruth), *Sida rhombifolia* (Kurunthotti), *Helicteres isora* (Itampiri valampiri), *Oxlis corniculata* (Puliyarila), *Aegle marmelos* (Koovalam), *Glycosmis pentaphylla*(Panal), *Azadirachta indica* (Veppu), *Eclipta alba* (Kayyooni), *Biophytum reinwardtii* (Mukkutt), *Calotropis gigantea* (Erikku), *Gymnema sylvestre* (Chakkarakkolli), *Hemidesmus indicus* (Nannari), *Justicia gendarussa* (Vathamkolli), *Phyllanthus amarus* (Keezharnelli) and commercial tree species such as *Hydnocarpus alpina* (Marotti), *Bombax malabaricum* (Ilavu), *Xanthoxylum rhetsa* (Kumitti), *Pterocarpus santalinus* (Rakthachandanam), *Cassia fistula* (Kanikonna), *Albizia lebbeck* (Vaga), *Leucaena leucocephala* (Subabul), *Achras sapota* (Sappota), *Mimusops elengi* (Elanji), *Tectona grandis* (Thekku), *Vitex altissima* (Mylellu) and *Vitex negundu* (Nechi). With regard to the fauna, seven families of butterflies, four families of anurans, six families of reptiles, 30 families of birds and 13 families of mammals were represented in the study area. The butterflies recorded included several colourful species such as *Papilio buddha*

(Buddha Peacock), *Papilio liomedon* (Malabar Banded Swallow tail), *Papilio paris tamilana* (Paris Peacock), *Cirrochora thais* (Tamil Yeoman), *Hypolimnas bolina* (Great Egg fly), *Hypolimnas misippus* (Danaid Egg fly), *Phalanta phalanta* (Common Leopard) and *Castalius rosimon* (Common Pierrot). The amphibians included*Ansonia ornate* (Malabar Torrent Frog) and *Rhacophorus malabaricus* (Malabar Gliding Frog). The reptiles were represented by *Lissemys punctata* (Indian Flap shell Turtle) and *Varanus bengalensis* (Indian Monitor Lizard). *Milvus migrans* (Pariah Kite) and *Haliastur Indus* (Brahminy Kite), *Athena brama* (Spotted Owlet), *Glaucidium radiatum* (Jungle Owlet) and *Otus bakkamoena* (Collard Scops Owl) were the birds recorded. Among mammals, *Pteropus giganteus* (Indian Flying Fox), *Megaderma lyra* (Indian False Vampire), *Paradoxurus hermaphroditus* (Palm Civet) and *Felis chaus* (Jungle Cat) were of interest. In all locations, natural vegetations in lateritic zones, sacred groves and natural forests as well as rivers supported rich biodiversity. Sixty one species of butterflies, 10 of anurans, 67 of birds and 17 of mammals were recorded from this habitat. This was followed by sacred groves and settlements. In the former, 58 species of butterflies, 12 species of anurans, seven species of reptiles and 52 species of birds have been recorded while in the latter, 54 species of butterflies, 12 species of anurans, 6 species of reptiles and 40 species of birds were recorded. Settlements and paddy fields were relatively poor in biodiversity probably due to pesticide and chemical fertilizer usage.

In the case of Muthur Grama panchayath, 45 species of plants belonging to trees, herbs and shrubs were recorded which included various ornamental and medicinal forms. *Cassia fistula, Tectona grandis, Anona squamosa, Artocarpus hirsutus, Psidium guava* and *Mangifera india* in addition to agricultural crops such as areca and coconut were the common tree species. *Sida acuta* and *S. rhombifolia* were the common medicinal plants. With regard to fauna, the anurans such as Jerdon's Bull Frog and Martens Bush Frog; the reptilians such as Buffer-striped Keelback and Common ptyas and the birds such as Black headed Oriole, Purple rumbed sun bird and Purple sun bird were characteristic to this area. Several species of spiders, 24

species of butterflies, six species of amphibians, five species of reptiles and 30 species of birds have been recorded.

In Paliyamangalam, Ayilamudichi Hills (Nemmara), four species of fungi, crustose lichens that adhere on rocks and tree trunks, bryophytes, pteridophytes, monocots and various aquatic plants have been recorded. The fauna comprised of several unidentified species of beetles, 37 species of butterflies, eight species of primary and secondary freshwater fishes, land snails and fresh water mussels, leaches, freshwater fishes, amphibians, lizards, dwarf geckoes and skinks; 23 species of birds and several species of mammals. In general, the moist deciduous forests contained maximum number of species. Medicinal plants such as *Sida cordata, S. rhombifolia, Peperomia pellucida, Aristolochia indica, Mucuna* spp. and *Ocimum basilicum* and trees such as *Terminalia arjuna, Annona squamosa, Xylia xylocarpa, Santalum album, Bombax malabaricum* and *Tectona grandis* have been recorded from various ecosystems. The fauna comprised of several species of rare butterflies including *Phalanta phalanta* and *Castalius rosimon*; exotic mollusks (*Achatina fullica*) and *Vaginulus* sp.; birds such as Malabar grey hornbill and Wagtails and mammals such as Sambar deer, spotted deer and wild cat.

From Karror Grama panchayath, two species of gymnosperms, 553 species of angiosperms were identified. The latter included including 26 species of orchids. Of the angiosperms recorded in this survey, 110 species constituting a little below 20%, are endemic to the Peninsular India. There were 62 species of grasses, 14 species of orchids and 31 species of legumes. The flora comprised of several riverine tree species such as *Madhuca neriifolia, Leea indica Mallotus phillipensis, Spatholobus purpureus, Holigarna grahamii, Holigarna nigra* and *Pongamia pinnata*; fruit trees such as *Anona squamosa* and *A. reticulata*; timber species such as *Hopea parviflora, Schleichera oleosa, Tectona grandis, Xylia xylocarpa* and *Vateria indica* and medicinal plants such as *Sida acuta, S. alnifolia, S. rhomboidea, S. scabrida, Dimocarpus longan, Ocimum americanum, O. gratissimum, Aristolochia indica, A. tagala, Zingiber officinale, Z. zerumbet,*

Rauvolfia micrantha and *R. serpentina*. With regard to the fauna, six species of mammals, 46 species of birds, 26 species of butterflies, 21 species of fishes, two of fresh water mussels and one species of fresh water prawn were recorded. Though small in area, the sacred grove Pathi was rich with good bird population. The high number of fishes in the Lalam thodu and high number of birds in the Sacred Groves show the significance of these habitats in sustaining biodiversity. The fauna comprised of several rare / restricted species. The butterflies, *Troides minos* (Southern birdwing), *Cirrochroa thais* (Tamil yeoman) and *Ixias Marianne* (White orange tip); the mussels *Lamellidens marginatus* (Kakka) and *Pila globosa* (Njavanikka); the fishes *Puntias ticto* (Pattar paral); the birds such as Malabar Whistling Thrush *Myiophonus horsfieldii*, Peninsular Spotted Babbler *Pellorneum ruficeps*, Nilgiri Plain Wren Warbler *Prinia ornate*; and the mammals such as Jungle Cat *Felis chaus*, Brown Mongoose *Herpestes brachyurus* and Palm Civet *Paradodurus hermaphroditus* were some interesting species recorded.

Contributors

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1. INTRODUCTION

Biodiversity monitoring through participatory approach

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Biodiversity is the totality of life forms from where we directly or indirectly draw ecological, economic and aesthetic benefits. It maintains the dynamics of ecosystems. The term 'Biodiversity' was first used by Walter Rosen in the Conference of National Forum on Biodiversity, American National Academy of Sciences (Wilson, 1988). Article 2 of the Convention on Biological Diversity (CBD) defines 'Biological diversity' as the variability among living organisms from all sources including *inter alia,* terrestrial, marine, and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species; between species and of ecosystem.

Conservation, sustainable use and equitable sharing of benefits have been the topics of serious debate among nations (WCMC, 1992; Heywood, 1995). However, due to the fast developmental activities, natural ecosystems have been totally destroyed or modified with the result that many life forms are under threat of extinction. Erosion of diversity due to various factors is of concern all over the world (IUCN, 1994)**.** For conservation and sustainable use of biodiversity, it is necessary to identify the components of this diversity and to monitor adverse impacts of developments on biological diversity. Biodiversity monitoring provides fundamental and essential information used by various basic and applied sciences.

The reasons for loss of biodiversity and methods of biodiversity assessment, monitoring and conservation have been discussed in detail (Abate, 1992; Burgess and Sharpe, 1981; Diamond, 1975, 1984; Forey *et al*.; Mc Neely *et al*., 1990; Noss and Csuti, 1994; Oliver and Beattie, 1996; Saunders *et al.,* 1991; UNEP-CBD, 1991, and Wilson, 1992). Inventorying of existing biota is the first step in conservation. India being a signatory to International Convention on Biodiversity Conservation, it is mandatory to prepare inventories of biota existing in different habitats and to monitor them (Morrison and Marcot, 1994). The forests of Western and Eastern Ghats, North Eastern India as well as the islands of Andaman and Nicobar Islands and

Lakshwadeep are locations that are rich in biodiversity. All these areas are known to habour a variety of rare, threatened and endemic plants and animals.

In the past, several attempts have been made to inventory the flora and fauna. Examples of inventorying on flora include those of Hooker (1872-97), Bourdillon (1908), Cooke (1901-08), Gamble (1915-36), Saldanah and Nicholson (1976), Ramachandran and Nair (1988) Sasidharan (1997) and Sasidharan and Sivarajan (1996). Pascal *et al.* (1997) compiled the details of distribution of endemic tree species of the Western Ghats. Most of the works on fauna have been confined to the early period of the century (Day, 1889; Boulenger, 1890; Hampson, 1892; Fraser, 1934; Talbot; 1939; Pocock 1939, 1941; Smith, 1943). Large mammals have been comparatively better-documented (Karanth 1985; Sukumar 1989 a, b; Easa, 1989). The pioneering work of Salim Ali (1953) and Salim Ali & Ripley (1987) on birds of India and the recent works of Daniels (1977) have added to the information on the avifauna of the country. The recent work on amphibians (Pillai, 1981, 1986); reptiles (Radhakrishnan 1996 b) and fishes (Hora and Nair 1941; Menon 1951, 1987; Jayaram 1981; Easa and Chand Basha 1996) indicate that vertebrates are comparatively well documented. Major contributions to the studies on invertebrates were from Zoological Survey of India. No attempts other than those of Gadgil (1996 a & b) and Mathew *et al.* (1998) have been made for long term monitoring of biodiversity in selected areas. At present, there is dearth for sufficiently trained workers to undertake this tremendous task of monitoring biodiversity.

The specific objectives of this programme supported by the State Committee on Science, Technology and Environment were to generate public interest in biodiversity conservation through monitoring of selected target species at different locations in Kerala part of Western Ghats through participatory action plan involving college teachers and students. For this, five locations representing typical landscapes such as forests, cultivated areas, aquatic ecosystems and wetlands were selected across the State. The study sites were stratified into different habitat types belonging to natural as well as man made domains and were sub-sampled for monitoring. The quadrate sampling techniques were adopted for plants and animals such as reptiles, amphibians and less mobile groups of insects while transect sampling was followed for highly mobile organisms like birds and butterflies. These sites were visited once in each

season for estimation of abundance of various species depending on their habitat. In addition to this, data were also be generated on traditional knowledge on biodiversity, conservation and utilization through interaction with the local people. The investigations were carried out by the students and teachers of the Biology Departments of five Colleges *viz.,* Nehru College, Kanhangad; MES College, Valanchery; NSS College, Nemmara; St. Thomas College, Palai and Catholicate College, Pathanamthitta. The project team was selected based on their earlier involvement in such programmes and their aptitude and interest. The whole programme was coordinated by KFRI. Prior to implementation of the study, necessary training programmes were conducted at KFRI for college teachers and students selected for this work with the help of experts from KFRI and other institutions such as the Centre for Ecological Science, Bangalore. The project team from each college was given full freedom to implement the study. Data generated by each college was presented separately and a General Summary of work carried out by various collaborating units is given at the end.

2. BIODIVERSITY OF SELECTED LOCATIONS IN KERALA

2.1. Biodiversity of Cheruvathur Grama Panchayath

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Introduction

Information available on the unique genetic wealth contained in the various habitats of Kerala is not complete. Many of its vegetation communities are yet to be studied. Information available on the ecology, behaviour and abundance of animals particularly the insects and the other invertebrates and insects, lower chordates, smaller mammals such as Chiroptera, Rodentia and Insectivora, is scarce. In the present study, attempts were made to assess species diversity of selected landscapes, using adequate sampling techniques of regular intervals and to pepare a checklist in Cheruvathur Grama Panchayat (Kasargod District) with the active participation of college students. The groups of organisms selected for this study included angiosperms under flora; and butterflies, amphibia, lacertilia, aves and mammalia under fauna. Attempts were also made for their documentation.

Study area

Cheruvathur Grama Panchayath situated in Kasargod District, 30 km south of Kasargod town is situated between latitudes12 and 12.25 degree North and longitudes 75 and 75.25 degree East. It covers an area of 2035.16 ha (Natarajan, 1997). It is boardered by Kariankote River in the north, Padne backwaters and Kariankote River in the west, Pilicode and Padne Grama Panchayaths in the south and Kayyur-Cheemeni Grama Panchayath in the east. The population density as per the 2001 census is 1396 per km^2. The LSE (Landscape Element) mapping (Pramod *et al.*, 1998) of the study area (Fig. 1) shows that its topographic variation ranges from coastal plain in the west to flat and undulating terrain with hills, valleys and laterite plateaus. It is an area of intense agricultural activities. Paddy, coconut, areca nut, pepper, cashew, plantain and tapioca form the main crops in the plain. Paddy occupied the largest area among annual crops. A high percent of the paddy fields are converted into coconut plantations and settlements. The laterite hills have unique ecological characteristic and Natural vegetation is

restricted only to certain pockets. Semi-evergreen growths remain in more arid areas. Undergrowth consists of a variety of annuals and perennials.

Climate

The climate is typically tropical and humid. The southwest monsoon during June-September accounts for the major share of rainfall compared to the northeast monsoon of October – December. December and January are the coldest months and April – May, the hottest during which time the average daily maximum and minimum temperature are around 35°C and 20°C respectively.

Habitats

The study area had different habitats such as laterite hills, sacred groves, paddy fields and human settlements. Details of each of these habitats are presented below.

Laterite plateau

The study area at Veeramala is a hillock characterized by a laterite plateau having the ruins of a Dutch Fort, built in the 18th century. It is a picnic spot from where the natural beauty of Kariankote River and the surroundings can be enjoyed. It is situated 1 km north to Chervathur Bus Stand and is adjacent to Chervathur-Kariankote portion of NH-17 and Kariankode River. It has an area of 29 ha cents in R.S.No 336 and is located at 42 m a.s.l. In fact, Veeramala is an important tourism destination of Kasargod District.

The area from Kozhikode to Kasargod is of typical formation of laterite hills, which are the major ecosystems for many plants and animals and serves as a good watershed area. The hill plateau shows an amphibious ecosystem. The alternation of very wet and dry creates an unusual ecological situation that supports a unique biota (Pl. 1, figs.1&2)

Sacred groves

Poomalakavu is essentially a coastal type grove, 0.81 ha in stretch and is adjacent to NH-17, near Chervathur bus stand. It is a center of worship connected with the Poomalakavu Bhagavathi Temple. Regarding the phyto-sociology of the grove, woody plants are the

dominant species and contain medium and small trees, shrubs, herbs, climbers, and epiphytes (Pl. 3, figs.1&2). This sacred grove which is of green type is an important habitat situated in the study area, It is with medium sized trees, with spreading canopy as the prominent plant growth. They also support several lichens, mosses or epiphytes like orchids or ferns. The undergrowth is dense having some clumps of cane, besides several species of shrubs, climbers and saplings of trees. Herbs also occur occasionally. Several species of fungi present in the area help in the decay and putrefaction of litter and dead wood lying in the ground. The wet tropical climate of the locality supports many evergreen species that include medicinal plants and endemic species of Western Ghats. They also support a rich fauna.

Paddy fields

Kodakkavayal, which formed an important paddy-cultivated agro-ecosystem in Chervathur Grama Panchayath, is primarily an agricultural area with diversity of crops and heterogeneity in cultivation (Pl.4, fig.1). The soil is a red ferruginous loam of laterite origin with an admixture of clay and mud. It is one among the 7 'Paatasekharams' (stretch of paddy field) present in the Panchayath, has an extension of 36.76 ha and is under the possession of 78 farmers (Chervathur Grama Panchayath Paddathirekha 2004-05). Generally, there exists two-crop system per year, depending mainly on the monsoon. Hence, any failure in rain would affect the productivity. The natural canal running along the entire length, bisecting the paddy field, is the main water recharge of the system. Indigenous varieties of paddy like Kayama, Malakkaran, Chitteni, Thavalakkannan and Vellariyan, which were cultivated until recently, have been replaced by the high yielding varieties. The practice of vegetable cultivation as a measure of crop rotation during the period of third crop has almost ceased now a days.

Human settlement

Kovval is a human settlement area coming under ward II of Chervathur Panchayath where various agricultural crops are raised in homesteads.

Methodology

Different methodologies such as total count, point count, line transect, etc., were adopted for the different taxonomic groups such as terrestrial angiosperms, butterflies, anurans, lizards, birds and mammals. Bimonthly survey has been conducted in each landscape element (LSE) under study. The species that could not be identified readily from the field were either photographed or collected for later identification. Sampling was done with minimum collection of specimens from the fields.

For making floral assessments transect count method was used. In the case of butterflies transect sampling was adapted. The size of the transect to be covered in one hour were fixed as 500 m long with 10 m width on either sides of the transect. Large butterflies that were identified by direct field observation and in the case of Smaller, unidentifiable ones were retained for detailed observation.

With regard to the herptofauna (amphibians and lizards), Line transect method (Benton and Werner, 1965) was employed in which a one hour all-out-search in all the possible microhabitats was carried out in pre-determined areas in each of the LSE types. For this, surveys were made in 15 grid lines, each extending 200 feet, in approximately one-acre area. The distance between grids was fixed as 1.4 m

Point count of 30 minutes duration covering an area approximately 50 m radius, was conducted for birds in the LSE units except at the paddy field where the assessment is made by adopting the total direct count method. A pair of lightweight binoculars of 8x40 **X** magnification was used for the field identification.

Trap method was used for estimation of small mammals that are either nocturnal or burrowing in hawk. Ordinary snap-back, mouse-traps, that were locally purchased, and set up at selected locations or runways, with roasted coconut piece and/or dry fish piece as baits, were used for secretive mammals such as mice, shrews and other species. Five trapping stations of two traps each were set up at 50 m intervals in a line across the sample areas. In the sacred grove, the traps were set up at random. The traps were checked at 24 hr intervals. After three 24 hr

periods of trapping, the traps were taken up and the total catch was tabulated. Conspicuous mammals were sampled using Line transect method.

In order to gather data on traditional knowledge, a questionnaire was prepared and distributed among the local people to identify the presence of certain mammals like lutra, jungle cat or other such species. Night observations were carried out from 7.30 to 10.30 pm using powerful torchlight for tracing nocturnal animals including some mammals and anurans. Indirect evidences like presence of nests, animal tracks, droppings, etc. were also considered.

Most of the field observations were made between 8 to 11 a.m. during the wet and dry seasons. Attempts were also made to collect people's biodiversity knowledge, including traditional knowledge. Data were entered in the data sheet provided to the students and later pooled together to present in the form of a report. Identity of the samples was done up to species level using available field guides and texts (given under the reference). The expertise from ZSI, Calicut and SEEK, Payyanur was also availed for identifying some vertebrate organisms and plants respectively. Plants were classified according to Bentham and Hooker's System of Classification of flowering plants with the current concepts of delimitation.

Data analysis

From the data collected in different landscape units, the indices of diversity, dominance, evenness and species richness were computed separately. These indices were used to assess the level of species diversity present in a given area, which is an essential pre-requisite for adoption of appropriate measures for conservation and sustainable utilization of biodiversity.

Diversity index: It is the most important community characteristic that describes fairly well the composition of the community and its relative abundance of all the species. It tries to integrate richness and evenness into one quantity and is often described as information-statistic index that can take into account rare species in a community and they may be more useful wherever such species exist. Diversity indices take into account abundance and species richness, indicating how evenly the individuals are distributed among species. Formulae used for calculating various diversity parameters are given below.

***Dominance index*:** Dominance indices are weighted towards the abundance of the commonest species. The patterns of relative abundance of species determine the dominance (D) of each species. This was calculated using the following using the formula:

Dominance index (D) = n*i* X 100/N,

Where, n*i* is the number of individuals in ***i***th order and N is the total number of individuals in all the groups observed.

***Species diversity*:** It is one of the most important community characteristics. Its simplest expressions form the species richness and evenness. These two, together describes the community composition fairly well. Species diversity was studied using Shannon-Weaner index (H), (Peter, 2002). It combines mathematically the effects of species richness and evenness and it measures the order/disorder in a habitat system.

Shannon-Weaner index (H) = $\sum$ P*i* ln P*i*,

Where, *Pi* is the portion of individuals in the *i*th species of *s* species.

Evenness index: It is complementary to diversity index concept. Evenness index shows the extension to which an individual is distributed evenly among the species and it ranges from zero to one. The index is calculated using the formula given by Pielou (1966).

Evenness index (e) = H/ln (s),

Where, 's' is the number of species recorded and H is the Shannon-Weaner index of diversity.

***Species richness index*:** The number of species present in a community is called species richness and biodiversity is measured in terms of species richness and evenness index. Though species richness can be measured simply by calculating the number of species, it will not give an idea about the abundance, dominance and distribution. Species richness is simply the number of species present in a community and is calculated using the formula given by Menhinick (1964).

Evenness index (d) = s / sqrt (N),

Where, s is the number of species recorded and N is the total number of individuals summed over all species.

Results

Information generated on the diversity of each landscape unit is presented below:

1. Laterite plateau (Veeramala)

Fauna

During the present study, 61 species of butterflies, 10 species of amphibians, six species of lizards, 67 species of birds and 18 species of mammals were sighted from the habitat. (Annexure I). Data generated on the various groups are presented below.

Butterflies: The 448 individuals of butterflies observed, belonged to 61 species, under seven families *viz*., Papilionidae, Pieridae, Satyridae, Danaidae, Nymphalidae, Lycaenidae and Hesperiidae. The butterflies recorded in this study included seven endemics, four rare and 55 common species. The butterflies observed in fairly large numbers were Crimson rose, Tailed jay, Common rose, Common wanderer, Jezebel, and Blue Mormon, Common tiger and Blue tiger (Pl.5). These butterflies were observed in fairly large numbers during the rainy season. The Red pierrot predominated during the retrieval of rain. Mottled emigrants were found on *Mussaenda* on the slopes. Blue pansy, Yellow pansy and Lemon pansy were observed during the dry season.

Amphibians: The 157 individuals of anurans observed belonged to 10 species under three families viz., Ranidae, Bufonidae, and Rhacophoridae. The Camouflaging Rufescent frog, an important burrowing toad, was found only during the monsoon seasons and can cope with a large dry season on hill. The number of *Euphlyctes (Rana) hexadactylus* and *Microhyla rubra* were restricted to the temporary pools on hill top during rainy season. *Polypedates maculates* was the most common species.

Reptiles: Chelonians were altogether absent. Among the lizards, the common skink, rock lizard and *Calotes* spp. were observed in the bushy slopes. The Indian monitor lizard, *Varanus* that has been included in Schedule I of the Indian Wildlife (Protection) Act, 1972, has become

very rare. Non-ophidian reptiles belonging to six species of four families, viz, Gekkonidae, Agamidae, Scincidae and Varanidae were also recorded.

Birds: The 486 individuals of birds observed belonged to 67 species under 28 families (*Annexure* I). Of these, the family Sturnidae, with its two species, dominated in the number of individuals although Corvidae with nine species was the richest family. Depending on their seasonal occurrence on the hill, they were categorized as residents (38 species), migrants (8 species), local migrants (8 species) and breeding residents (13 species) (Salim Ali, 1996). The Malabar crested lark, Paddy field pipit, Red and Yellow wattled Lapwings were the ground-nesting residents. The present disturbed condition of the habitat had resulted their decline in number. The Common sandpipers, Golden Plovers, Turnstones, Curlew Sandpiper, and Wagtails were the migrants observed. The Egrets, White backed Munia, Black headed Munia, Blyth's Myna, and Pariah Kite were the local migratory species observed.

Mammals: Seventeen mammalian species of 12 families were noted here (*Annexure I).* Jackal was the most obvious nocturnal mammal freely roaming around the hill and preying on the Indian Gerbille, a common rodent species in the locality. The population of jungle cat, Black napped hare and Toddy cat was reported to be fast declining. The fallen quills of Indian Porcupine which has been included in the Schedule I of the Indian Wildlife Act, was an indirect evidence for its presence in the locality.

Faunal Diversity

Butterflies: Among butterflies, the family, Nymphalidae, having 20 species, showed the maximum value of dominance index (31.70) (Table 2) followed by Pieridae (27.46) having only 9 species, Papilionidae (12.72) having 11 species and Satyridae (2.01). Dominance index of individual species is given in Table 1.

Amphibia: Among amphibians the anuran, *Haplobatrachus tigerinus* (Ranidae) had the highest value (19.75), followed by *Euphlyctis cyanophlyctis* (18.47) family (Table 4).

Reptiles: Among reptiles, *Calotes versicolor* showed highest value, 44.19 and *Varanus bengalensis* the lowest (4.65) (Table 6).

Birds: Of the 26 avian families observed, the family, Sturnidae, represented with two species only, showed the maximum index (12.5) followed by Columbidae (11.46). The families, Corvidae and Passeridae came next (Table 8). The Travancore Pied Kingfisher of Cerylidae registered the lowest index value (0.2). Spotted Munia, Common Myna and Blyth's Myna showed the maximum dominance index among the avian species observed (Table 10).

Mammals: The most dominant mammalian species was the Indian Flying Fox, *Pteropus giganteus* showed index 26.80. Jungle cat, bandicoot rat and Indian porcupine shared the least dominance index (Table 11).

Flora

Among the 157 species coming under 59 families recorded, 36 species belonged to Fabaceae, 19 to Euphorbiaceae and 21 to Rubiaceae. The flora on the plateau at high elevation was dominated by grass during dry season and aquatic, semi-aquatic plants during wet season. The common grass varieties included *Eragrostis uniloides, Ischaemum indicum, Heteropogon contortus, Arundinella* spp. and *Pennisetum polystachyon* (Plate 1). Patches of scrub jungle with cashew and acacia were present along the slopes.

With the onset of the south west monsoon, the entire plateau became wet, with shallow temporary pools, which caused the growth of herbs and perennial plants. A total of 156 plant species were recorded from the plain and slopes of Veeramala. The plains showed dominance of *Eriocaulon* spp., *Neonotis nepatifolia, Murdania* sp., *Rotala malabarica, R. malampuzhensis, Drosera indica, Ramphicarpa longifora* etc. The white-heads of *Eriocaulon* and the pretty blue perianth of *Utricularia* added beauty to the plains during wet seasons. *Utricularia reticulata* and *U. graminifolia* are insectivorous plants very common to the site. One of the most important insectivorous plants is *Drosera indica* of Droseraceae. Its flowers during Aug.–Sept. and the flowers are small and pink in colour.

Three newly recorded taxa collected and named by the botanists of Calicut University from Madayippara, Kannur District, are also found distributed in Veeramala. The endemic species, *Lepidagathis keralensis* (Plate 2, figs. 1 & 2) belonging to Acanthaceae, (Madhusoodanan and Singh, 1992) is very common here. Flowering and fruiting of the plants took place during Dec. to April. However, by May, all plant parts, except the rootstock became dry and with the onset of monsoon in June, new shoots arose from the rootstocks. Other species recorded was *Rotala malabarica*, named (Pradeep, 1989) from *R. malampuzhensis*. *Justicia ekakusuma* – a newly reported taxa from Madayippara (Pradeep and Sivarajan, 1991). The distribution of the latter was comparatively less than the other species.

Plants unique to the laterite ecosystem included a ground orchid having greenish white flowers called *Habenaria diphylla.* Besides this, the parasitic herbs, *Striga lutea, Ramphicarpa longiflora* which opens at the evenings; *Sopubia trifida* and *S. delphinifolia* having bell-shaped corolla; a beautiful herb, *Polycarpaea corymbosa*; blue flowered *Evolvulus alsinoides*; yellow flowered *Polygala chinensis* and *P. elongate* and the pink flowered *Neonotis nepatifolia* were also noted.

The scrub jungle including shrubs, trees, lianas and climbers form a protective cover to the hill slopes. Evergreen and deciduous plant species are common in this vegetation. The important tree species included *Adenanthera pavonina, Buchnania lonzan, Calophyllum inopyllum, Erithrina indica, Glyricidia sepium, Holigarna arnottiana, Hydnocarpus alpina, Lannea coromandeliana, Sapium insignae, Tectona grandis* and *Careya arborea.* A patch of cultivated *Acacia auriculiformis* and *Anacardium occidentale* were also present on the slopes. *Ixora coccinea, Zizyphus rugosa, Z. oenoplea, Canthium didymum, Tabernaemontana* sp. and *Mussaenda frondosa* were the important shrubs. Woody climbers like *Calycopteris floribunda, Connarus monocarpus, Derris scandens* and *Hugonia mystax* showed luxuriant growth.

Many species having medicinal value were recorded from this area. This included *Rauvolfia serpentina*, *Holarrhena pubescens, Abrus precatoreus, Andrographis paniculata, Biophytum* sp., *Ixora coccinea, Leucas* sp., *Sida* spp. and *Premna* sp.

2. Sacred Groves (Poomalakavu) (Plate 3, figs. 1&2)

Fauna

The faunal composition of the sacred grove studied included 235 individuals of butterflies of 58 species, belonging to seven families; 12 anuran species, out of the 171 individuals observed, belonging to the four families; 47 reptilia individuals belonging to six species, under 6 families; 52 avian species belonging to 22 families out of 252 individuals spotted and 12 mammalian species of eight families out of the 53 individuals noted (Annexure I).

Butterflies: The 58 species of butterflies recorded from this area included four rare and eight endemic species. The grove contained many larval food plants for the growth of butterfly species.

Amphibia: The anurans were represented by 12 species belonging to four families. *Microhyla ornata* and *M. rubra* were scarce. A skipper frog was seen in the well of the grove and its surroundings. The tree frogs, *Rhacophorus* and *Polypedatus* showed an increase in number during the flowering season of trees during which the insect-prey population is increased (Plate 6).

Reptiles: Skink and Calotes were the most common lacertilians found here. Green calotes were very rare. The monitor lizard, *Varanus benghalensis* was absent in this habitat. Of the two common types of turtles in Kerala, the flap shell turtle, *Lissemys punctata* is on the verge of extinction. Its close relative, the Pond Terrapin, is fast decling in numbers (Plate 6).

Birds: Among birds, Passeridae, Sturnidae and Corvidae are the predominant avian families. The 52 species observed can be categorized into 31 residents, three migrants, eight local migrants and nine breeding residents.

Faunal diversity

Butterflies: As revealed from the Table 2, out of the 235 individuals belonging to 58 species of butterflies spotted, the family Nymphalidae, containing 19 species, showed maximum dominance index (34.04), followed by Pieridae (23.98) and Lycaenidae (4.26) that included only five species.

Amphibians: *Haplobatachus tigerinus* showed maximum index among the anurans (23.39) while *Bufo melanostictus* registered the lowest value (1.70) (Table 4).

Reptiles: Among reptiles, the agamid lizard, *Calotes versicolor* attained the highest dominance index (42.86) while *Melanochelys trijuga* of Emydidae showed lowest index (Table 6).

Birds: Among the 22 avian families observed, Passeridae, represented by 3 species, was the dominant family (17.06) (Table 8). Sturnidae and Cervidae were common. Scolopacidae, in which only a single individual of Sanderling, *Calidris alba* was observed, showed the least value (0.40). Dominance index of individual species is shown in Table 10.

Mammals: The Indian Flying Fox (Table 11) had the highest index scale (30.18) while jackal and bandicoot rat registered the least index value (1.89).

Flora

Altogether, 118 species of plants belonging to 52 angiosperm families were recorded (Annexure II). Euphorbiaceae with 10 species was the dominant family. The other widely distributed families were Compositae, Fabaceae and Rubiaceae. The characteristic species of the coastal groves such as *Calanus rotang, Calophyllum inophyllum, Ardisia rhomboidea,* and *Pandanus tectorius* were common in the grove. Certain species such as *Aglaea elaegnoidea, Alstonia scholaris, Canthium didymum, Clerodendrum viscosum, Memecylon malabaricum, M. umbellatum, Glycosmis pentaphylla, Zizyphus oenoplea* and *Z. rugosa* which were commonly seen in laterite groves were also recorded here. Large trees were not present except for 2 banyan trees. *Adenanthera pavonina, Alstonia scholaris, Hydnocarpus alpina, Holigarna*

arnottiana were the common tree species. Among these the last two are Western Ghats endemics. There were also patches of cane, *Calamus rotang* (Plate 3 and Fig. 2).

Out of 118 species recorded, seven species were South Indian endemics, which included *Ployalthia korintii, Holigarna arnottiana, Memecylon umbellatum, Hydnocarpus alpina, Hoya wightii, Jasminum malabaricum, Pouzolzia zeylanica.* Among these, *Hoya wightii* of Asclepidaceae is a rare plant. Medicinal plants like *Aristolochia indica, Asparagus racemosus, Centella asiatica, Cyathula prostrata, Elephantopus scaber, Ixora coccinea, Phyllanthus amarus* and *Rauvolfia serpentina* were also seen.

3. Paddy Fields (Kodakkavayal) (Plate 5)

Faunal elements

One hundred and eighty nine butterflies grouped under 42 species, and beloning to seven families; 345 number of anurans of nine species belonging to four families; 37 reptilians of four species belonging to four families; 585 birds of 47 species belonging to 22 families and 22 mammalia of seven species belonging to 6 families were recorded from this habitat. Details of faunal elements recorded are given below.

Butterflies: The family Nymphalidae showed highest value (31.02) while the least value was recorded for Satyridae (4.28) (Table 2).

Amphibia: The anurans showed maximum dominance in the case of *Haplobatrachus tigrinus* (23.77) and the least value for *Philautus* sp. (Table 4).

Reptiles: Among reptiles, lacertilian species and number was low. The chelonian species, *Lissemys punctata* showed the maximum index (Table 6).

Birds: Among birds, the family Ardeidae with its seven species showed high dominance (25.64) followed by Passeridae (16.99) while least dominance was noted for Pycnonotidae and Coraciidae (Table 8). The most dominant species under mammalia was Indian Gerbille, with

the index 40.91. The least value was represented by the lesser bandicoot rat and *Funambulus palmarum* (Table 11).

Flora

Floristic study has been restricted in recording the natural vegetation. Erect and prostrate herbs were common. Out of the 80 species recorded (Annexure II), the common herb species were *Mollugo pentaphylla, Grangea maderaspatana, Heliotropium keralensis, Scoparia dulsis, Eclipta alba, Hediotis biflora, Merremia tridentate* and *Centella asiatica*. In waterlogged areas, *Lemna* sp., *Nymphoides crystata* and *Salvinia molesta* were found. *Justicia gendarussa, Pandanus tectoreus* are found in adjacent areas. A rare medicinal plant, *Eupatorium ayyapana*, locally called Vishalyakarani, was found growing on the edge of the adjacent canal (Plate 6)

4. Human settlement (Kovval)

Fauna

Of the 285 specimens of butterflies observed, there were 54 species belonging to seven families. Among 238 amphibia, there were 12 species of anurans belonging to the four families. Of the 113 reptiles observed, there were the six species belonging to six families. The 617 birds observed belonged to 40 species under 20 families. Similarly, the 88 mammals observed, belonged to 10 species under six families. The number of individuals belonging to the groups under study and their dominance index is shown in Tables 2, 4, 6, 8 and 11. Specific details generated in this study are presented below.

Butterflies: Among butterflies, the highest value was registered by the family Nymphalidae (29.12) in which there was a high dominance of the Common Bush Brown *Mycalesis persius*.

Amphibia: The anuran *Polypedatus maculatus* showed maximum dominance index (21.85).

Reptilia: Among reptilia, *Hemidactylus brookii* showed the highest value (34.51) and *Lissemys punctata* showed the lowest value (0.88).

Birds: Of the 20 avian families observed here, the family Corvidae, represented with nine species, showed maximum value (22.20), and followed by Sturnidae (19.77). Jacanidae and Strigidae, represented by a single species each, showed the least value (0.16).

Malmmals: The squirrel *Funambulus palmarum* showed the highest index (27.06) while the Pigmy bat and the Small Indian Civet showed the lowest dominance index (2.35 each).

Flora

Total of 135 species of plants were recorded from the house premises including both the cultivated and non-cultivated species. The latter included wild plants growing in association with the cultivated species. The important cultivated species were *Cocos nucifera, Areca catechu, Anacardium occidentale, Anona squamosa, Artocarpus heterophyllus, Carica papaya, Amorphophallus companulatus, Dioscorea* sp., *Moringa olifera, Manihot utilisima* and *Coffea arabica* although the latter was not so common. The major crops were coconut and areca nut. Besides these different kinds of vegetables, *Musa paradisiaca* and various ornamental plants were also recorded.

Overall Diversity

The overall diversity indices calculated for each of the study area, using Shannon's formula, are shown in Table 13. The diversity index of all the groups was relatively the same in all the four habitats (Fig 2). The index tends to increase with the number of species in the sample. High species diversity may indicate a healthy environment. The values of the Shannon-Weaner index for natural communities are generally between 1.5 and 3.5 (Sterling, 2002)

Species Richness Index

Species richness found in the four habitats under study, is calculated by using Menhinick formula and the indices are compared in Table 14. Menhinick index in general showed higher values for Veeramala and Poomalakkavu and lower values for the other two localities (Fig. 3).

Evenness Index

The evenness index for amphibians and butterflies in the settlement area was 0.97 and 0.94 respectively, both indicating a more or less uniform distribution of them in the area. The values for other habitats were slightly lower (Table 15 and Fig 4). Reptilian and avian evenness indices were relatively lower in the settlement areas (0.75 and 0.79 respectively). Evenness index shows the extent to which an individual is distributed evenly among species. Evenness is ranged from 0 to 1. When evenness is close to zero, it indicates that most of the individuals belong to one or a few species/categories. When evenness is close to one, it indicates that each species or categories consist of the same number of individuals.

Summary

Preliminary studies on the diversity and species abundance of the major biotic wealth such as angiosperm plants, butterflies, anurans, non-ophidian reptiles, birds and mammals was carried out during the year 2003 to 2005, in the selected landscapes of Cheruvathur Grama Panchayath of Kasargod district. The study was carried out in a laterite hill, a sacred grove, a paddy field and a human settlement area in the Panchayath. The area has a tropical humid climate and contains mixed vegetation that includes semi aquatic vegetation, vegetation in cultivated and wastelands and also the restricted natural vegetation in the isolated sacred grove.

Floristic study was confined to angiosperms using the total inventory method. A total of 295 species of plants, coming under 239 genera, spread over 82 families were recorded. Trees, shrubs, herbs, climbers, epiphytes etc., were common in the study area. Of the total species, 39.26% is composed of herbs (117 numbers including 8 prostrate herbs), 22.48% shrubs (67 numbers including woody climbers), 26.17% trees (78 numbers) and 12.09% special groups of plants including climbers (28 species), epiphytes (5 species) and parasites (3 species). A total of about 12 medicinal plants, currently used in Ayurvedic and modern medicines, were also recorded. Eleven species recorded in this study are South Indian endemics (Annexure II).
The family Fabaceae with its 36 species (Papilionaceae-19, Caesalpinaceae-10 and Mimosaceae-7) showed a high degree of diversity followed by Rubiaceae (21 species) and Euphorbiaceae (19 species). Other widely distributed families were Verbenaceae, Labiatae, Asteraceae, Apocyanaceae and Acanthaceae.

The floral study indicated its richness with endemic plants, many medicinal plants and records of extended distribution of many species. In the laterite plateau, the species occurrence is more during the wet phase, consisting of a variety of aquatic and semi aquatic plants. But, during dry season, the number was comparatively less and the area was dominated by grass.

During the study of fauna, seven families of butterflies, four families of anurans, six families of reptiles, 30 families of birds and 13 families of mammals were recorded from the study area. The overall diversity index of the study area was 1.78 for butterflies (Table 3), 2.19 for anurans

(Table 5), 1.77 for reptiles (Table 7), 2.85 for aves (Table 9) and 2.51 for mammals (Table 12). Shannon's index of species diversity calculated for the different taxa are given separately in Table 13 and can be compared easily compared from Figure 2. The values of Shannon-Weaver index for natural communities are generally between 1.5 and 3.5 (Sterling, 2002). The Menhinck value for richness index was higher in Veeramala and Poomalakavu compared to the other two habitats (Table 14 and Fig. 3). The evenness index in all the four study sites as revealed from Table 15, showed a moderately uniform distribution of species. The low species richness in the settlement area and the paddy field might be due to the low adaptive capacity or due to the human interference at these habitats, such as the altered landuse pattern. The fragmentation of paddy field into small isolated patches, in the long run, may eliminate species. As a part of the intense agricultural practice, farmers make use of more chemical pesticides and fertilizers. The relatively high diversity index and species richness of the sacred grove and laterite hill indicate that these areas should be conserved with special interest.

As anywhere else, the most serious threat to the biota was due to developmental activities of man. The increase in the demand of land for housing, construction of roads, railway lines etc., has affected the natural conditions in the area. Encroachment, grazing, collection of firewood and green manure, felling of trees, etc., were other activities lading to destruction of biota.

In the recent history of the area, the wetlands are dominated by the invasion of aquatic weed, notably salvinia and water hyacinth, the world's fastest growing plants. It may be due to the increasing pollution of wetlands by organic wastes, human generated wastes getting increasingly washed in with rain water run-off, increasing use of fertilizers in agriculture, which all contributed to greater availability of 'food' for aquatic weeds.

The North Malabar area is also blessed with a number of sacred groves, many of which are still well flourishing in spite of severe threats of degradation (Jayarajan, 2004). Kasaragod is perhaps the only district in Kerala having the greatest number of sacred groves (Chand Basha, 1998). Many groves are now threatened and altered both in terms of size, vegetation structure and species composition. There are instances where the temple deity in association with a grove is rehabilitated to a new place after conducting special 'poojas' (Unnikrishnan, 1997) and then the grove was cleared for alternate landuse.

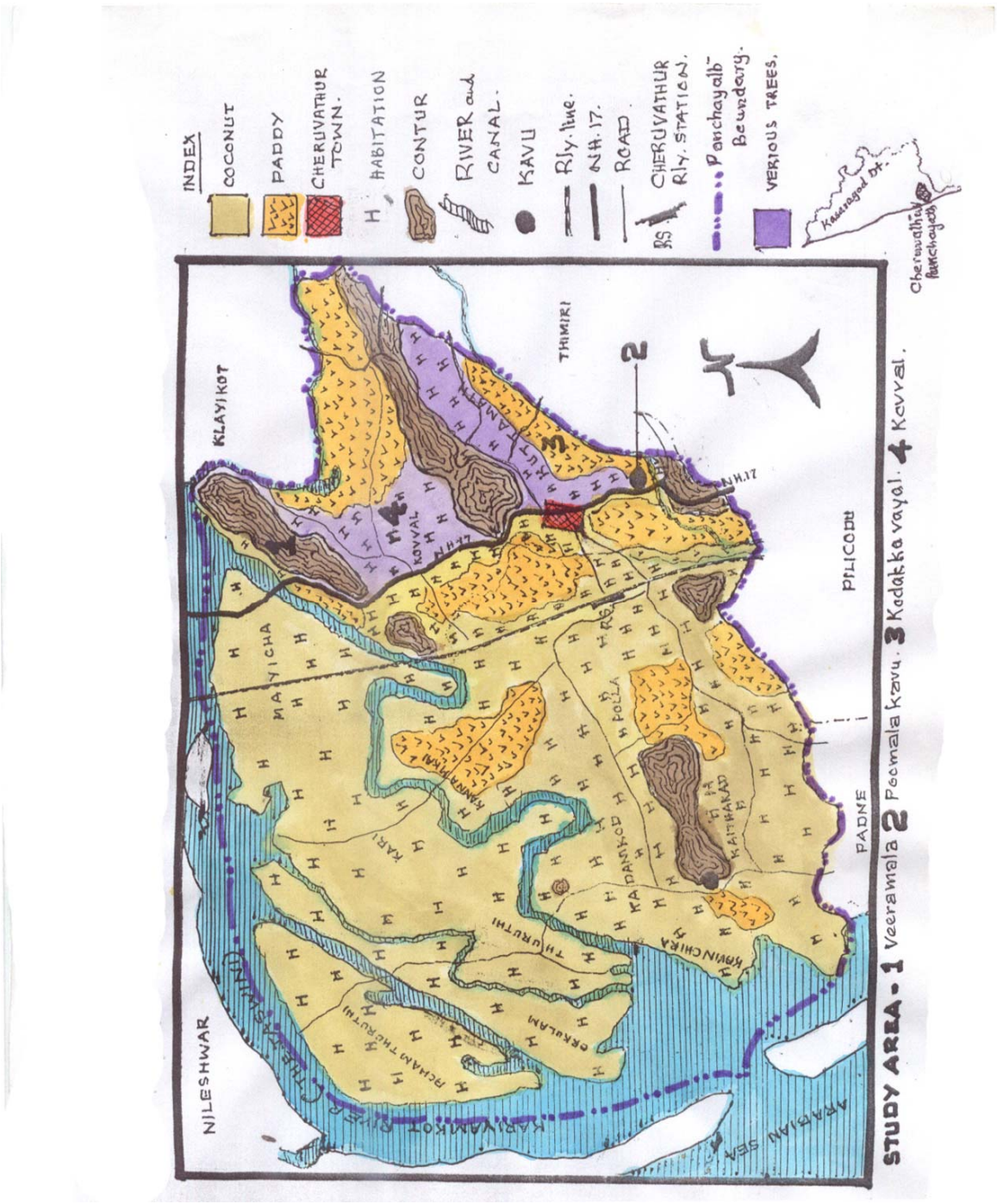


Fig 1. LSE mapping of Cheruvathur Panchayath

Fig. 1

Fig. 2

Plate 1, Figs. 1 & 2. Plateau of Veeramala during dry (above) and wet (below) seasons

Fig.1

Fig.2

Plate 2. Fig. 1 *Leidagathes keralensis*, characteristic of the laterite ecosystem, in bloom.

Fig. 2. Close up of a flower

Fig. 1.

Fig. 2.

Plate 3 (figs. 1 & 2) Poomalakavu

Fig. 1. General view of a sacred grove

Fig. 2. A patch of cane growing inside the Poomalakavu

Fig. 1

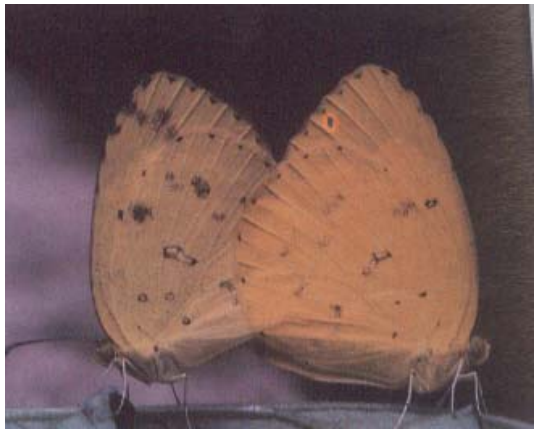
Fig. 2

Plate 4. Kodakkavayal

Fig. 1. View of a paddy field

Fig. 2. *Eupatorium ayyappana*

Common Cerulean



Common Grass Yellow

Mottled Emigrant

Malabar Banded Peacock

Grey Pansy

Blue Mormon

Plate 5. Some common butterflies of Cheruvathur

Indian Burrowing Frog

Indian Cricket Frog

Common Tree Frog

Ornate Microhylid

Unidentified frog

Indian Flapshell Turtle

Plate 6. Some vertebrates recorded from Cheruvathur

Table 1. Dominance index of butterfly species (All observations are from 5 sample units in each study area)

No	Species	Veeramala		Poomala		Kodakkavayal		settlement	
		I	D	I	D	I	D	I	D
1	*Chilasa chlytia chlysia* (Lin.)	1	0.22321	1	0.42553	-	-	1	0.35088
2	*Graphium agamemnon* (Felder & Felder)	9	2.00893	2	0.85106	5	2.6455	6	2.10526
3	*Graphium doson*	-	-	1	0.42553	-	-	-	
4	*Graphium sarpedon* (Felder & Felder)	1	0.22321	-	-	2	1.0582	1	0.35088
5	*Pachliopta aristolochiae* (Fabricius)	14	3.125	3	1.2766	-	-	3	1.05263
6	*Pachliopta hector* (Lin.)	6	1.33929	2	0.85106	2	1.0582	2	0.70175
7	*Papilio buddha* Westwood	7	1.5625	2	0.85106	-		1	0.35088
8	*Papilio demoleus* (Lin.)	-	-	3	1.2766	2	1.0582	2	0.70175
9	*Papilio helenus* (Hampson)	2	0.44643	3	1.2766	-	-	1	0.35088
10	*Papilio liomedon* Moore	2	0.44643	1	0.42553	-	-	-	-
11	*Papilio paris tamilana* Moore	1	0.22321	1	0.42553	-	-	-	-
12	*Papilio polymnestor* Cramer	-	-	2	0.85106	-	-	8	2.80702
13	*Papilio polytes* (Lin.)	11	2.45536	7	2.97872	3	1.5873	5	1.75439
14	*Triodes minos* Cramer	3	0.66964	6	2.55319	2	1.0582	8	2.80702
15	*Anaphaeis aurota* (Fabricius)	1	0.22321	1	0.42553	-	-	-	-
16	*Catopsilia pomona* (Fabricius)	29	6.47321	5	2.12766	4	2.1164	15	5.26316
17	*Catopsilia pyranthe* (Lin.)	7	1.5625	1	0.42553	2	1.0582	2	0.70175
18	*Cepora nerissa* (Fabricius)	1	0.22321	-		1	0.5291	-	-
19	*Delias eucharis* (Dury)	14	3.125	9	3.82979	6	3.1746	5	1.75439

20	*Eurema hecabe* Moore	29	6.47321	10	4.25532	7	3.7037	12	4.21053
21	*Hebomia glaucippe* Butler	1	0.22321	2	0.85106	-	-	-	-
22	*Leptosia nina nina* (Fabricius)	26	5.80357	11	4.68085	17	8.99471	10	3.50877
23	*Pareronia valeria* (Fabricius)	15	3.34821	15	6.38298	8	4.2328	10	3.50877
24	*Elymnias hypermenstra* Butler	5	1.11607	3	1.2766	6	3.1746	14	4.91228
25	*Mycalesis perseus* Frushtorfer	4	0.89286	9	3.82979	2	1.0582	10	3.50877
26	*Orsotriona medus* (Moore)	-	-	2	0.85106	-		12	4.21053
27	*Danaus chrysippus* (Lin.)	7	1.5625	3	1.2766	3	1.5873	2	0.70175
28	*Danaus genutia* (Cramer)	-	-	1	0.42553	2	1.0582	1	0.35088
29	*Euploea core core* (Cramer)	16	3.57143	6	2.55319	4	2.1164	12	4.21053
30	*Parantica aglea* (Stoll)	5	1.11607	4	1.70213	-	-	-	-
31	*Tirumala limniace* Gmel.	18	4.01786	9	3.82979	8	4.2328	15	5.26316
32	*Tirumala serpentrionis* (Frushstorfer)	4	0.89286	5	2.12766	-	-	1	0.35088
33	*Acraea violae* (Fabricius)	8	1.78571	3	1.2766	3	1.5873	4	1.40351
34	*Ariadne merione* Cramer	1	0.22321	1	0.42553	-	-	4	1.40351
35	*Charaxes solon* (Fabricius)	-	-	-	-	2	1.0582	4	1.40351
36	*Cirrochora thais* Fabricius	14	3.125	3	1.2766	6	3.1746	1	0.35088
37	*Cupha erymanthis* Fruhstorfer	4	0.89286	3	1.2766	1	0.5291	-	-
38	*Euthalia aconthea* Fruhstorfer	9	2.00893	-	-	-	-	7	2.45614
39	*Hypolimnas bolina* Dury	12	2.67857	3	1.2766	4	2.1164	6	2.10526
40	*Hypolimnas misippus* (Lin.)	15	3.34821	8	3.40426	-	-	3	1.05263
41	*Junonia almana* (Lin.)	8	1.78571	1	0.42553	9	4.7619	6	2.10526

42	*Junonia atlites* (Lin.)	-		4	1.70213	12	6.34921	4	1.40351
43	*Junonia hierta* Fabricius	5	1.11607	-		-		-	
44	*Junonia lemonias* (Lin.)	9	2.00893	10	4.25532	6	3.1746	3	1.05263
45	*Melanitis leda*	1	0.22321	2	0.85106	-		2	0.70175
47	*Moduza procris* Fruhstorfer	7	1.5625	15	6.38298	4	2.1164	2	0.70175
48	*Mycalesis perseus* Frushtorfer	-	-	6	2.55319	-	-	22	7.7193
49	*Neptis hyla* (Moore)	9	2.00893	3	1.2766	-	-	9	3.15789
50	*Neptis jumbah* Moore	2	0.44643	-		-	-	1	0.35088
51	*Pantaporia hordonia* (Stoll)	-	-	2	0.85106	-	-	1	0.35088
52	*Parthenos Sylvia* Moore	13	2.90179	6	2.55319	1	0.5291	-	-
53	*Phalanta phalanta* (Dury)	12	2.67857	5	2.12766	2	1.0582	1	0.35088
54	*Polyura athamas*	-	-	1	0.42553	-	-	-	-
55	*Précis iphita* Fruhstorfer	5	1.11607	2	0.85106	2	1.0582	-	
56	*Tanaecia lepidea* Fruhstorfer	5	1.11607	-	-	6	3.1746	1	0.35088
57	*Vanessa cardui* (Lin.)	2	0.44643	-	-	-	-	-	-
58	*Ypthima huebneri* Krby	1	0.22321	2	0.85106	-	-	2	0.70175
59	*Caleta caleta* (Hewitson)	2	0.44643	2	0.85106	-	-	-	-
60	*Castalius rosimon* (Fabricius)	3	0.66964	1	0.42553	1	0.5291	5	1.75439
61	*Talicade nyseus* (Gurin-Menevi)	4	0.89286	1	0.42553	-	-	4	1.40351
62	*Jamides celeno* (Fabricius)	11	2.45536	5	2.12766	5	2.6455	3	1.05263
63	*Spindasis vulcanus* (Moore)	2	0.44643	-	-	2	1.0582	-	-
64	*Loxura atymnus* (Cramer)	8	1.78571	-	-	-	-	7	2.45614
65	*Rathinda amor* (Fabricius)	-		-	-	4	2.1164	1	0.35088
66	*Cheritra freja* (Fabricius)	5	1.11607	1	0.42553	1	0.5291	-	
67	*Lampides boeticus*	-	-	-	-	9	4.7619	4	1.40351

68	*Euchrysops enejus* (Fabricius)	3	0.66964	-	-	13	6.87831	6	2.10526
63	*Celaenorrhinus ambareesa* (Moore)	1	0.22321	-	-	-		-	-
64	*Sarangesa desahava*	6	1.33929	2	0.85106	4	2.1164	3	1.05263
65	*Sarangesa purendra* (Evans)	4	0.89286	-	-	-	-	-	-
66	*Spialia galba*	2	0.44643	1	0.42553	-	-	-	-
67	*Tagiades litigiosa* (Moschller)	2	0.44643	1	0.42553	-	-	2	0.70175
68	*Taractrocera maevius* (Moore)	-	-	-	-	3	1.5873	-	-
69	*Udaspes folus* (Cramer)	14	3.125	11	4.68085	3	1.5873	8	2.80702
		448		**235**		**189**		**285**	

Table 2. Dominance index of butterfly families (All observations are from 5 sample units in each study area)

No	Family	Veeramala		Poomala		Kodakkavayal		Settlement	
		I	**D**	**I**	**D**	**I**	**D**	**I**	**D**
1	Papilionidae	57	12.7232	34	14.4681	16	8.55615	38	13.33333
2	Pieridae	123	27.4554	54	22.9787	43	22.9947	54	18.94737
3	Satyridae	9	2.00893	14	5.95745	8	4.27807	36	12.63158
4	Danaidae	50	11.1607	28	11.9149	17	9.09091	31	10.87719
5	Nymphalidae	142	31.6964	80	34.0426	58	31.016	83	29.12281
6	Lycaenidae	38	8.48214	10	4.25532	35	18.7166	30	10.52632
7	Hesperiidae	29	6.47321	15	6.38298	10	5.34759	13	4.561404
		448		**235**		**187**		**285**	

I = Individuals D = Dominance Index

Table 3. Characteristics of butterfly community

No	Location	No.of Species	No.of Individuals	Diversity Ind.	Rich. Ind.	Even. Ind.
1	Veeramala	61	448	1.6911	0.33072	0.869053
2	Poomala	58	235	1.71593	0.45663	0.881814
3	Kodakkavayal	42	187	1.73452	0.51119	0.891367
4	Settlement	54	285	1.82358	0.41464	0.937135
	Pooled values	**69**	**1155**	**1.7804**	**2.03029**	**0.42049**

Table 4. Dominance index of anuran species (all observations are from 5 sample units in each area)

No.	Species	Veeramala		Poomalakavu		Kodakkavayal		Settlement	
		I*	D*	I	D	I	D	I	D
1	*Euphlyctis cyanophlyctis* (Schneider)	29	18.471	14	8.18713	62	17.971	34	14.28571
2	*E.hexadactylus* (Lesson)	28	17.834	19	11.1111	68	19.7101	22	9.243697
3	*Haplobatrachus tigerinus* (Daudin)	31	19.745	40	23.3918	82	23.7681	27	11.34454
4	*Limnocectes limnocharis* (Gravenhorst)	11	7.0064	27	15.7895	71	20.5797	14	5.882353
5	*Rana malabarica (Tschudi)*	19	12.102	8	4.67836	11	3.18841	42	17.64706
6	*R. temporalis* (Gunther)	2	1.2739	-	-	-	-	6	2.521008
7	*Sphaerotheca rufescens* (Jerdon)	3	1.9108	-	-	-	-	-	-
8	*S. breviceps* (Schneider)	-		-	-	-		2	0.840336
9	*Nyctibatrachus minor*	2	1.2739	6	3.50877	14	4.05797	-	-
10	*Ansonia ornate* (Gunther)	-		-	-	-		2	0.840336
11	*Bufo melanostictus* (Schneider)	19	12.102	21	12.2807	17	4.92754	27	11.34454
12	*Microhyla ornata* (Dum. & Bibr.)	-	-	2	1.16959	16	4.63768	-	-
13	*M. rubra* (Jerdon)	-	-	4	2.33918	-	-	6	2.521008
14	*Rhacophorus malabaricus* Jerdon	-	-	4	2.33918	-	-	-	-
15	*Polypedates maculates* (Gray)	13	8.2803	23	13.4503	4	1.15942	52	21.84874
16	*Philautus* sp	-	-	3	1.75439	-	-	4	1.680672
		157		**171**		**345**		**238**	

* I = Individuals * D = Dominance Index

Table 5. Characteristics of anuran community

No	Location	No.of species	No.of individuals	Diversity ind.	Rich. ind.	Even. ind.
1	Veeramala	10	157	2.03023	0.798087	0.881718
2	Poomala Kavu	12	171	2.11594	0.917663	0.851517
3	Kodakkavayal	9	345	1.89285	0.484544	0.861473
4	Settlement area	12	238	2.13157	0.777844	0.970119
	Pooled Data	**16**	**911**	**2.19298**	**0.530104**	**0.79095**

Table 6. dominance index of reptilian species (All observations from 5 sample units in each study area)

No	Species	Veeramala		Poomalakavu		Kodakkavayal		Settlement	
		I	D	I	D	I	D	I	D
1	*Melanochelys trijuga* (Schweigger)	-	-	2	4.08163	10	27.027	4	3.539823
2	*Lissemys punctata* (Lacepede)	-	-	3	6.12245	16	43.2432	1	0.884956
3	*Hemidactylus brookii* (Gray)	-	-	-	-	-	-	39	34.51327
4	*Cremaspis* sp. *(?)*	6	13.9535	1	2.04082	-	-	-	-
5	*Calotes versicolor* (Daudin)	19	44.186	21	42.8571	8	21.6216	42	37.16814
6	*C. calotes* (Lin.)	4	9.30233	2	4.08163	-	-	-	-
7	*Psummophilus* sp.	4	9.30233	-		-		-	-
8	*Mabuya carinata* (Schneider)	8	18.6047	16	32.6531	3	8.10811	22	19.46903
9	*Varanus bengalensis* (Schneider)	2	4.65116	4	8.16327	-	-	5	4.424779
		43		**49**		**37**		**113**	

I = Individuals D = Dominance Index

Table 7. Characteristcs of reptilian community

No.	Location	No.of Species	No.of Individuals	Diversity Ind.	Rich. Ind.	Even. Ind.
1	Veeramala	6	43	1.53313	0.914991	0.85565
2	Poomalakavu	7	49	1.46271	1.0211	0.75168
3	Kodakkavayal	4	37	1.25095	0.657596	0.90237
4	Settlement area	6	113	1.35167	0.564433	0.754381
	Pooled data	**9**	**242**	**1.77352**	**0.578542**	**0.807164**

Table 8. Dominance index of avian families (all observations are from 5 sample units in each study area)

No	Family	Veeramala		Poomalakavu		Kodakkavayal		Settlement	
		I	D	I	D	I	D	I	D
1	Phalacrocoracidae	-	-	-	-	40	6.8376	-	-
2	Ardeidae	37	7.7083	6	2.381	150	25.641	54	8.75203
3	Accipitridae	25	5.2083	10	3.9683	22	3.7607	61	9.88655
4	Rallidae	1	0.2083	16	6.3492	19	3.2479	29	4.70016
5	Jacanidae	-	-	3	1.1905	16	2.735	1	0.16207
6	Charadridae	27	5.625	-	-	35	5.9829	8	1.2966
7	Scolopacidae	3	0.625	1	0.3968	5	0.8547	-	-
8	Columbidae	55	11.458	14	5.5556	31	5.2991	60	9.72447
9	Psittacidae	13	2.7083	8	3.1746	6	1.0256	4	0.6483
10	Cuculidae	4	0.8333	8	3.1746	-	-	6	0.97245
11	Centropodidae	4	0.8333	4	1.5873	6	1.0256	18	2.91734
12	Anatidae	-	-	-	-	2	0.3419	-	-
13	Strigidae	5	1.0417	5	1.9841	2	0.3419	1	0.16207

14	Apodidae	25	5.2083	-		26	4.4444	-	-
15	Alcedinidae	4	0.8333	3	1.1905	9	1.5385	11	1.78282
16	Dacelonidae	-	-	2	0.7937	11	1.8803	13	2.10697
17	Cerylidae	1	0.2083	-	-	4	0.6838	-	-
18	Meropidae	16	3.3333	-	-	18	3.0769	-	-
19	Coraciidae	2	0.4167	-	-	2	0.3419	-	-
20	Megalaimidae	9	1.875	7	2.7778	-	-	4	0.6483
21	Picidae	2	0.4167	2	0.7937	-	-	2	0.32415
22	Corvidae	38	7.9167	32	12.698	10	1.7094	137	22.2042
23	Muscipidae	10	2.0833	7	2.7778	4	0.6838	12	1.94489
24	Sturnidae	60	12.5	35	13.889	32	5.4701	122	19.7731
25	Sylviidae	14	2.9167	20	7.9365	-	-	4	0.6483
26	Hirundinidae	24	5	6	2.381	36	6.1538	-	-
27	Pycnonotidae	20	4.1667	14	5.5556	2	0.3419	6	0.97245
28	Alaudidae	29	6.0417	-	-	-	-	-	-
29	Nectarinidae	12	2.5	6	2.381	-	-	4	0.6483
30	Passeridae	40	8.3333	43	17.063	97	16.581	60	9.72447
		480		**252**		**585**		**617**	

I= Individuals D = Dominance index

Table 9. Characteristcs of avian community

No	Location	No.of species	No.of Individuals	Diversity Index	Rich. Ind.	Even. Ind.
1	Veeramala	67	480	3.80124	3.08454	0.90087
2	poomalakavu	52	252	3.46938	3.40168	0.86974
3	Kodakkavayal	47	585	3.33549	1.94321	0.86633
4	Settlement	40	617	2.92133	1.61034	0.79193
	Pooled Data	**82**	**1938**	**2.85087**	**1.862674**	**0.64694**

Table 10. Dominance index of avian species (all observations are from 5 sample units in each study area)

No	Species	Veeramala		Poomalakavu		Kodakkavayal		Settlement	
		I	D	I	D	I	D	I	D
1	*Phalacrocorax niger* (Viellot)	-	-	-	-	40	0.0684	-	-
2	*Ardeola grauii* (Sykes)	11	0.022634	2	0.007937	69	0.1179	31	0.05024
3	*Adreola striatus* (Bonaparte)	-	-	-	-	3	0.0051	2	0.00324
4	*Bubulcus ibis* (Boddaert)	23	0.047325	-	-	34	0.0581	19	0.03079
5	*Egretta alba*	-	-	1	0.003968	7	0.012	-	-
6	*Egretta garzetta* (Lin.)	3	0.006173	3	0.011905	29	0.0496	-	-
7	*Nycticorax nycticorax* (Lin.)	-	-	-	-	6	0.0103	-	-
8	*Ardea cinerea* Gould	-	-	-	-	2	0.0034	2	0.00324
9	*Milvus migrans* Sykes	10	0.020576	6	0.02381	12	0.0205	40	0.06483
10	*Haliastur Indus* (Boddaert)	12	0.024691	2	0.007937	10	0.0171	20	0.03241
11	*Accipiter badius* (Gmelin.)	2	0.004115	2	0.007937	-	-	1	0.00162
12	*Haliaeetus albicilla* (Lin.)	1	0.002058	-	-	-	-	-	-
13	*Metopidius indicus* (Latham)	-	-	3	0.011905	16	0.0274	1	0.00162
14	*Amaurornis phoenicurus* (Pennant)	-	-	14	0.055556	14	0.0239	29	0.047
15	*Porphyrio porphyrio* (Latham)	1	0.002058	2	0.007937	5	0.0085	-	-

16	*Vanellus malabaricus* (Boddaert)	9	0.018519	-	-	14	0.0239	4	0.00648
17	*Vanellus indicus* (Boddaert)	8	0.016461	-	-	6	0.0103	2	0.00324
18	*Charadrius euronicus* (Gmelin.)	3	0.006173	-	-	-		-	-
19	*Pluvialis dominica* (Gmelin.)	7	0.014403	-	-	4	0.0068	2	0.00324
20	*Charadrius leschenaultii* Lesson	-	-	-	-	7	0.012	-	-
21	*Charadrius alexandricus* (Lin.)	-	-	-	-	4	0.0068	-	-
22	*Gallinago gallinago* (Lin.)	-	-	-	-	3	0.0051	-	-
23	*GalL.ago minima* (Brunnich)	-	-	-	-	2	0.0034	-	-
24	*Areneria interpres* (Lin.)	2	0.004115	-		-	-	-	-
25	*Calidris alba* (Pallas)	1	0.002058	1	0.003968	-	-	-	-
26	*Columba livia* Strickland	20	0.041152	9	0.035714	25	0.0427	50	0.08104
27	*Streptopelia chinensis* (Gmelin.)	15	0.030864	5	0.019841	6	0.0103	-	-
28	*Trenon pompadora* (Jerdon)	20	0.041152	-	-	-	-	10	0.01621
29	*Psittacula krameri* (Bechstein)	6	0.012346	4	0.015873	4	0.0068	2	0.00324
30	*Psittacula cyanocephala* (Lin.)	5	0.010288	3	0.011905	2	0.0034	2	0.00324
31	*Loriculus vernalis* (Sparrman)	2	0.004115	1	0.003968	-	-	-	-
32	*Eudynamys scolopacea* (Lin.)	4	0.00823	8	0.031746	-	-	6	0.00972
33	*Centropus sin*ensis *Stresemann*	4	0.00823	4	0.015873	6	0.0103	18	0.02917
34	*Nettapus coromandelianus* (Gmelin.)	-	-	-		2	0.0034	-	-
35	*Athena brama* (Temminck)	2	0.004115	2	0.007937	2	0.0034	-	-
36	*Glaucidium radiatum* (Blyth)	1	0.002058	1	0.003968	-	-	-	-
37	*Otus bakkamoena* Pennant	2	0.004115	2	0.007937	-	-	1	0.00162
38	*Apus affinis* (J.E.Gray)	15	0.030864	-	-	20	0.0342	-	-
39	*Cypsiurus balasiensis*	10	0.020576	-	-	6	0.0103	-	-
40	*Alcedo atthis Kleinschnidt*	4	0.00823	3	0.011905	9	0.0154	11	0.01783
41	*Halcyon smyrnensis (Boddaert)*	6	0.012346	2	0.007937	4	0.0068	12	0.01945

42	*Pelargopsis capensis* (Lin.)	-	-	-	-	7	0.012	1	0.00162
43	*Ceryle rudis* Whistler & Kinnear	1	0.002058	-	-	4	0.0068	-	-
44	*Merops phillipinus*(Lin.)	12	0.024691	-	-	16	0.0274	-	-
45	*Merops orientalis* (Latham)	4	0.00823	-	-	2	0.0034	-	-
46	*Coracias benghalensis* (Lin.)	2	0.004115	-	-	2	0.0034	-	-
47	*Megalaima viridis* (Boddaert)	6	0.012346	4	0.015873	-	-	4	0.00648
48	*Megalaima haemacephala* (Latham)	2	0.004115	2	0.007937	-	-	-	-
49	*Megalaima rubricaprilla* (Blyth)	1	0.002058	1	0.003968	-	-	-	-
50	*Dinopium benghalensa* Kloss	2	0.004115	2	0.007937	-	-	2	0.00324
51	*Oriolus oriolus* Sykes	1	0.002058	1	0.003968	-	-	2	0.00324
52	*Oriolus xanthornus* (Lin.)	2	0.004115	2	0.007937	-	-	2	0.00324
53	*Dendrocitta vagabunda* Whistler & Kinnear	4	0.00823	4	0.015873	-	-	2	0.00324
54	*Corvus splendens* Madarasz	12	0.024691	6	0.02381	-	-	98	0.15883
55	*Corvus macrorhynchos* Sykes	2	0.004115	4	0.015873	-	-	19	0.03079
56	*Dicrurus adsimilis* Viellot	10	0.020576	6	0.02381	8	0.0137	6	0.00972
57	*Dicrurus paradiseus* (Lin.)	2	0.004115	3	0.011905	2	0.0034	6	0.00972
58	*Pericrocotus cinnamomeus* (Gmelin.)	-	-	2	0.007937	-	-	-	-
59	*Terpsiphona paradisi* (Swainson)	2	0.004115	2	0.007937	-	-	2	0.00324
60	*Aegithina tiphia* (Gmelin.)	3	0.006173	2	0.007937	-	-	-	-
61	*Saxicoloides fulicata* (Lin.)	4	0.00823	3	0.011905	-	-	-	-
62	*Copsychus saularis* Sclater	6	0.012346	4	0.015873	4	0.0068	12	0.01945
63	*Acridotheres tristis* (Lin.)	30	0.061728	15	0.059524	32	0.0547	82	0.1329
64	*Sturnus malabaricus blythis* (Jerdon)	30	0.061728	20	0.079365	-	-	40	0.06483
65	*Turdoides striatus* (Jerdon)	8	0.016461	12	0.047619	-	-	-	-
66	*Orthotomus sutorius* (Latham)	6	0.012346	8	0.031746	-	-	4	0.00648
67	*Hirundo smithii* Stephens	4	0.00823	-	-	6	0.0103	-	-
68	*Hirundo rustica* Scopoli	20	0.041152	6	0.02381	30	0.0513	-	-

69	*Pycnonotus jocosus* (Gould)	12	0.024691	8	0.031746	2	0.0034	6	0.00972
70	*Pycnonotus cafer* (Lin.)	6	0.012346	4	0.015873	-	-	-	-
71	*Pycnonotus leuteolus* (Lesson)	2	0.004115	2	0.007937	-	-	-	-
72	*Mirafra assamica* Blyth	6	0.012346	-	-	-	-	-	-
73	*Eremopterix grisea* (Scopoli)	15	0.030864	-	-	-	-	-	-
74	*Galerida malabarica* (Scopoli)	8	0.016461	-	-	-	-	-	-
75	*Nectarinia lotenia* (Whistler)	2	0.004115	2	0.007937	-	-	-	-
76	*Nectarina asiatica* (Latham)	4	0.00823	2	0.007937	-	-	2	0.00324
77	*Nectarina zeylonica* (Hermann)	6	0.012346	2	0.007937	-	-	2	0.00324
78	*Passer domesticus* (Jardina & Selby	-	-	-	-	35	0.0598	60	0.09724
79	*Motacilla alba* Sykes	2	0.004115	-	-	2	0.0034	-	-
80	*Motacilla maderaspatensis* Gmelin.	2	0.004115	1	0.003968	-	-	-	-
81	*Anthus novaescelandiae malayensis* Eyton	6	0.012346	2	0.007937	8	0.0137	-	-
82	*Lonchura punctulata* (Lin.)	30	0.061728	40	0.15873	52	0.0889	-	-
		486		**252**		**585**		**617**	

Table 11. Dominance index of mammalian species (all observations are from 5 sample units in each study area)

No	Species	Veeramala		Poomala		Kodakkavayal		Settlement	
		I	D	I	D	I	D	I	D
1	*Suncus murinus* (Lin.)	-	-	-	-	-	-	9	10.5882
2	*Cynopterus sphinx* (Vahl)	6	6.38298	8	15.094	-	-	-	-
3	*Pteropus giganteus* (Brunnich)	26	27.6596	16	30.189	-	-	-	-
4	*Megaderma lyra* E.Geoffroy	2	2.12766	2	3.7736	-	-	-	-
5	*Pipistrellus mimus*	4	4.25532	2	3.7736	-	-	2	2.35294
6	*Canis aureus* Lin.	2	2.12766	1	1.8868	-	-	-	-
7	*Lutra perspicillata* I.Geoffroy	1	1.06383	-	-	-	-	-	-
8	*Paradoxurus hermaphroditus* (Pallas)	2	2.12766	2	3.7736	-	-	-	-
9	*Viverricula indica* (Desmarest)	3	3.19149	-	-	-	-	2	2.35294
10	*Herpestes edwardsii* (Geoffroy)	11	11.7021	3	5.6604	2	9.0909	3	3.52941
11	*Felis chaus* Guldenstaedt	1	1.06383	-	-	-	-	-	-
12	*Lepus nigricollis* F.Cuvier	6	6.38298	-	-	-	-	-	-
13	*Funambulus palmarum* (Lin.)	6	6.38298	9	16.981	1	4.5455	23	27.0588
14	*Tatera indica* (Hardwicke)	8	8.51064	3	5.6604	9	40.909	12	14.1176
15	*Bandicota bengalensis* (Gray)	-	-	-	-	1	4.5455	5	5.88235
16	*Bandicota indica* (Bechstein)	1	1.06383	1	1.8868	2	9.0909	6	7.05882
17	*Rattus rattus* (Lin.)	8	8.51064	4	7.5472	4	18.182	16	18.8235
18	*Mus musculus* Lin.	6	6.38298	2	3.7736	3	13.636	10	11.7647
19	*Hystrix indica* Kerr.	1	1.06383	-	-	-	-	-	-
		94		**53**		**22**		**88**	

Table 12. Characteristics of mammalian community

No	Locality	No.of individuals	Diversity index	Richness Index	Evenness index
1	Veeramala	94	2.4118	1.75342	0.8513
2	Poomalakave	53	2.1127	1.64833	0.8502
3	Kodakkavayal	22	1.6643	1.49241	0.8553
4	Settlement	88	2.3001	1.08465	0.9649
	Pooled data	**257**	**2.5068**	**1.18519**	**0.851368**

Table 13. Shannon's diversity indices at the study area

Location	Insecta	Amphibia	Reptilia	Aves	Mammalia
Veeramala	1.6911	2.03023	1.533	3.801	1.412
Poomalakavu	1.71593	2.1159	1.385	3.469	2.112
Kodakkavayal	1.73452	1.89285	1.2509	3.335	1.664
Kovval	1.82358	2.13157	1.3516	2.921	2.3001

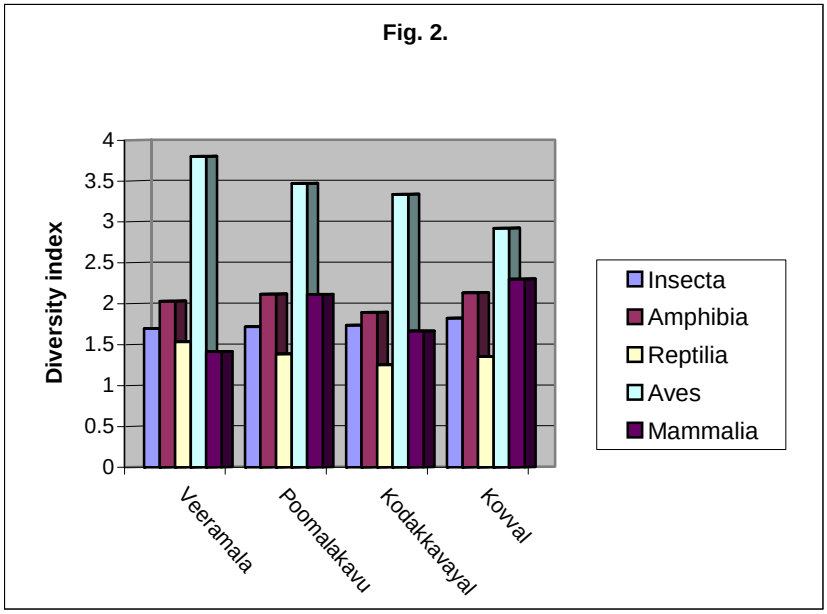


Fig. 2. Diversity index of the study area

Table 14. Overall species richness indices

Location	Insecta	Amphibia	Reptilia	Aves	Mammalia
Veeramala	0.330719	0.798087	0.91499	3.08454	1.75342
Poomalakavu	0.45663	0.917663	0.85714	3.40168	1.64833
Kodakkavayal	0.511189	0.484544	0.6576	1.94321	1.49241
Kovval	0.414644	0.777844	0.56443	1.61034	1.08465

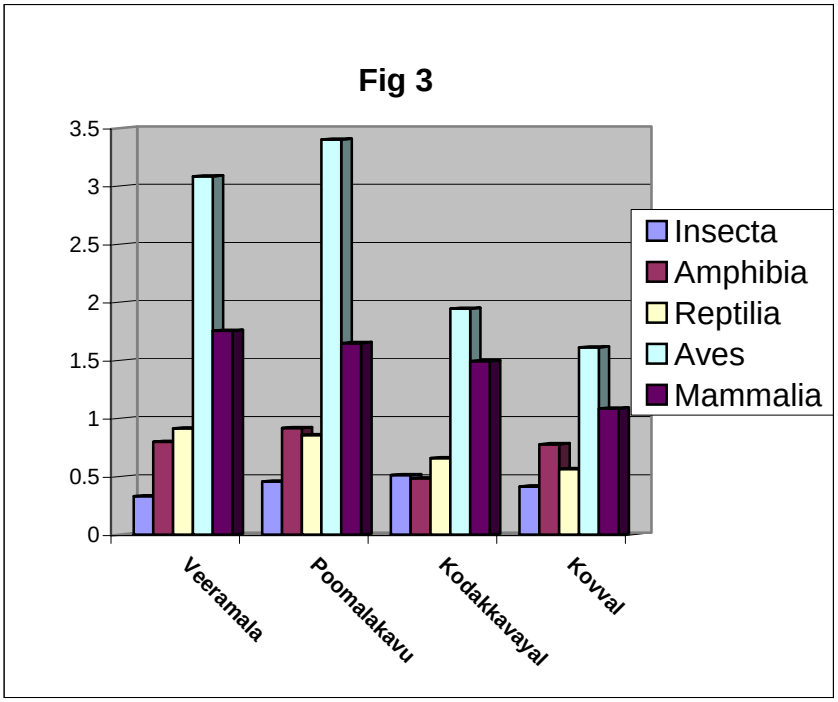


Fig. 3. Species richness of the study area

Table 15. Over all species evenness indices

Location	Insecta	Amphibia	Reptilia	Aves	Mammalia
Veeramala	0.869053	0.881718	0.85565	0.9087	0.8513
Poomalakavu	0.881814	0.851517	0.80629	0.86974	0.8502
Kodakkavayal	0.891367	0.861473	0.90237	0.86633	0.8553
Kovval	0.937135	0.970119	0.75438	0.79193	0.9649

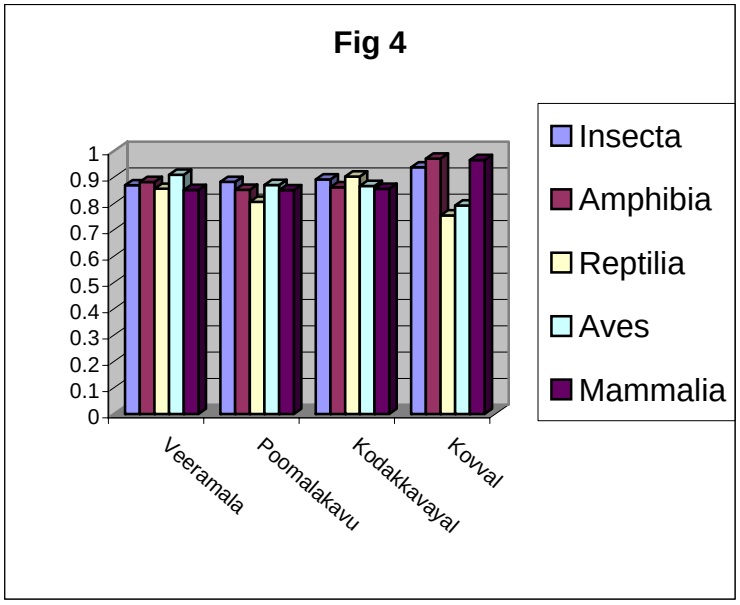


Fig. 4. Species evenness of the study area

ANNEXURE I

FAUNA OF THE STUDY AREA

No	ORDER/FAMILY / *Species*	Common name	Study Areas *				
			VM	PK	KV	HS	Remark
BUTTERFLIES							
LEPIDOPTERA/ PAPILIONIDAE							
1	*Chilasa chlytia chlysia* (Lin.)	Common Mime	1	1	-	1	C @
2	*Graphium agamemnon* (Felder&Felder)	Tailed jay	9	2	5	6	C
3	*Graphium doson*	Common Jay	-	1	-	-	
4	*Graphium sarpedon* (Felder & Felder)	Blue Bottle	1	-	2	1	C
5	*Pachliopta aristolochiae* (Fabricius)	Common Rose	14	3	-	3	C
6	*Pachliopta hector* (Lin.)	Crimson Rose	6	2	2	2	C, E, SI
7	*Papilio buddha* Westwood	Buddha Peacock	7	2	-	1	R, E,WG
8	*Papilio demoleus* (Lin.)	Lime Butterfly	-	3	2	2	C
9	*Papilio helenus* (Hampson*)*	Red Helen	2	3	-	1	C
10	*Papilio liomedon* Moore	Malab. Banded Swallow tail	2	1	-	-	R, E,WG
11	*Papilio paris tamilana* Moore	Paris Peacock	1	1	-	-	R
12	*Papilio polymnestor* Cramer	Blue Mormon	-	2	-	8	C, E, PI
13	*Papilio polytes* (Lin.)	Common Mormon	11	7	3	5	C
14	*Triodes minos* Cramer	Southern Bird wing	3	6	2	8	C,E,SI WG
PIERIDAE							
15	*Anaphaeis aurota* (Fabricius)	Pioneer	1	1	-	-	C
16	*Catopsilia pomona* (Fabricius)	Common Emigrant	29	5	4	15	C
17	*Catopsilia pyranthe* (Lin.)	Mottled Emigrant	7	1	2	2	C
18	*Cepora nerissa* (Fabricius)	Common Gull	1	-	1	-	C
19	*Delias eucharis* (Dury)	Common Jezebel	14	9	6	5	C

20	*Eurema hecabe* Moore	Common Grass Yellow	29	10	7	12	C
21	*Hebomia glaucippe* Buttler	Giant Orange Tip	1	2	-	-	C
22	*Leptosia nina nina* (Fabricius)	Psyche	26	11	17	10	C
23	*Pareronia valeria* (Fabricius)	Common Wanderer	15	15	8	10	C, E, SI
	SATYRIDAE						
24	*Elymnias hypermenstra* Butler	Common Palm Fly	5	3	6	14	C
25	*Mycalesis perseus* Frushtorfer	Common Bush Brown	4	9	2	10	C
26	*Orsotriona medus* (Moore)	Nigger	-	2	-	12	C
	DANAIDAE						
27	*Danaus chrysippus* (Lin.)	Plain Tiger	7	3	3	2	C
28	*Danaus genutia* (Cramer)	Striped Tiger	-	1	2	1	C
29	*Euploea core core* (Cramer)	Common Crow	16	6	4	12	C
30	*Parantica aglea* (Stoll)	Glassy Blue Tiger	5	4	-	-	C
31	*Tirumala limniace* Gmel.	Blue Tiger	18	9	8	15	C
32	*Tirumala septentrionis* (Frushstorfer)	Dark Blue Tiger	4	5	-	1	C
	NYMPHALIDAE						
33	*Acraea violae* (Fabricius)	Tawny Coster	8	6	3	4	C
34	*Ariadne merione* Cramer	Common Castor	1	1	-	4	C
35	*Charaxes solon* (Fabricius)	Black Rajah	-	-	2	4	C
36	*Cirrochora thais* Fabricius	Tamil Yeoman	14	3	6	1	C&E, SI
37	*Cupha erymanthis* Fruhstorfer	Southern Rustic	4	3	1	-	C
38	*Euthalia aconthea* Fruhstorfer	Common Baron	9	-	-	7	C
39	*Hypolimnas bolina* Dury	Great Egg fly	12	3	4	6	C
40	*Hypolimnas misippus* (Lin.)	Danaid Egg fly	15	8	-	3	C
41	*Junonia almana* (Lin.)	Peacock Pansy	8	1	9	6	C
42	*Junonia atlites* (Lin.)	Grey Pansy	-	4	12	4	C
43	*Junonia hierta* Fabricius	Yellow Pansy	5	-	-	-	C
44	*Junonia lemonias* (Lin.)	Lemon Pansy	9	10	6	3	C

45	*Melanitis leda*	Common Evening Brown	1	2	-	2	C
47	*Moduza procris* Fruhstorfer	Commander	7	15	4	2	C
48	*Mycalesis perseus* Frushtorfer	Common Bush Brown	-	6	-	22	C
49	*Neptis hyla (*Moore)	Common Sailor	9	3	-	9	C
50	*Neptis jumbah* Moore	Chestnut Streaked Sailor	2	-	-	1	C
51	*Pantaporia hordonia* (Stoll)	Common Lascar	-	2	-	1	C
52	*Parthenos sylvia* Moore	Clipper	3	6	1	-	C
53	*Phalanta phalanta* (Dury)	Common Leopard	12	5	2	1	C
54	*Polyura athamas*	Common Nawab	-	1	-	-	
55	*Précis iphita* Fruhstorfer	Chocolate Pansy	5	2	2	-	C
56	*Tanaecia lepidea* Fruhstorfer	Grey Count	5	-	6	1	C
57	*Vanessa cardui* (Lin.)	Painted Lady	2	-	-	-	C
58	*Ypthima huebneri* Krby	Common Evening Brown	1	2	-	2	C
	LYCAENIDAE						
59	*Caleta caleta* (Hewitson)	Angled Pierrot	2	2	-	-	C
60	*Castalius rosimon* (Fabricius)	Common Pierrot	3	1	1	5	C
61	*Talicade nyseus* (Gurin-Menev.)	Red Pierrot	4	1	-	4	C
62	*Jamides celeno* (Fabricius)	Common Cerulean	11	5	5	3	C
63	*Spindasis vulcanus* (Moore)	Common Silver L.e	2	-	2	-	C
64	*Loxura atymnus* (Cramer)	Yam Fly	8	-	-	7	C
65	*Rathinda amor* (Fabricius)	Monkey Puzzle	-	-	4	1	C
66	*Cheritra freja* (Fabricius)	Common Imperial	5	1	1	-	C
67	*Lampides boeticus*	Pea Blue	-	-	9	4	C
68	*Euchrysops enejus* (Fabricius)	Gram Blue	3	-	13	6	C
	HESPERIIDAE						
63	*Celaenorrhinus ambareesa* (Moore)	Malabar Spotted Flat	1	-	-	-	C, E, PI

64	*Sarangesa desahava*	Common Small Flat	6	2	4	3	
65	*Sarangesa purendra* (Evans)	Spotted Small Flat	4	-	-	-	R
66	*Spialia galba*	Indian Grizzled Skipper	2	1	-	-	
67	*Tagiades litigiosa* (Moschller)	Water Snow Flat	2	1	-	2	C
68	*Taractrocera maevius* (Moore)	Common Grass Dart	-	-	3	-	C
69	*Udaspes folus* (Cramer)	Grass Demon	14	11	3	8	C
	Total No. of Species = 69	**Total No. of Individuals**	**448**	**235**	**189**	**285**	
C=Common. R=Rare. E=Endemic. WG=Western Ghat. SL=Sri Lanka. PI=Peninsular India. SI=South India.							
ANURANS							
	RANIDAE						
70	*Euphlyctis cyanophlyctis* (Schneider)	Skittering Frog	29	14	62	34	
71	*Euphlyctis hexadactylus* (Lesson)	Indian Pond Frog	28	19	68	22	
72	*Haplobatrachus tigerinus* (Daudin)	Indian Bull Frog	31	40	82	27	
73	*Limnonectes limnocharis* (Gravenhorst)	Indian Cricket Frog	11	27	71	14	
74	*Rana malabarica* (Tschudi)	Fungoid Frog	19	8	11	42	
75	*Rana temporalis* (Gunther)	Bronze Frog	2	-	-	6	
76	*Sphaerotheca rufescens* (Jerdon)	Rufescent Burrowing Frog	3	-	-	-	
77	*Sphaeritheca breviceps* (Schneider)	Indian Burrowing Frog	-	-	-	2	
78	*Nyctibatrachus minor*		2	6	14	-	
	BUFONIDAE						
79	*Ansonia ornate* (Gunther)	Malabar Torrent Frog	-	-	-	2	
80	*Bufo melanostictus* (Schneider)	Common Indian Toad	19	21	17	27	
	MICROHYLIDAE						
81	*Microhyla ornata* (Dum. & Bibr.)	Ornate Microhylid	-	2	16	-	

82	*Microhyla rubra* (Jerdon)	Red Microhylid	-	4	-	6	
	RHACOPHORIDAE						
83	*Rhacophorus malabaricus* Jerdon	Malabar Gliding Frog	-	4	-	-	
84	*Polypedatea maculates* (Gray)	Common Tree Frog	13	23	4	52	
85	*Philautus* sp.	Bush Frog	-	3	-	4	
	Total no. of species = 16	**Total No. of Individuals =**	**157**	**171**	**345**	**238**	
		REPTILIA					
	CHELONIA /EMYDIDAE						
86	*Melanochelystrijuga* (Schweigger)	Indian Pond Terrapin	-	2	10	4	
	TESTUDINIDAE						
87	*Lissemys punctata* (Lacepede)	Indian Flap shell Turtle	-	3	16	1	
	SQUAMATA/ GEKKONIDAE						
88	*Hemidactylus brookii* (Gray)	Spotted House Gecko	-	-	-	39	
89	*Cremaspis* sp.	Dwarf Gecko	6	1	-	-	
	AGAMIDAE						
90	*Calotes versicolor* (Daudin)	Common Garden Lizard	19	21	8	42	
91	*Calotes calotes* (Lin.)	Southern Green Calotes	4	2	-	-	
92	*Psummophilus* sp.	Rock Lizard	4	-	-	-	
	SCINCIDAE						
9	*Mabuya carinata* (Schneider)	Brahminy skink	8	16	3	22	
	VARANIDAE						
94	*Varanus bengalensis* (Schneider)	Indian Monitor Lizard	2	4	-	5	
	Total No. of species = 9	**Total No. of individuals =**	**43**	**49**	**37**	**113**	
		AVES					
	PHALACROCORACIDAE (Cormorants)						

96	*Phalacrocorax niger* (Viellot)	Little Cormorant	-	-	40	-	R !!
	ARDEIDAE (Herons)						
97	*Ardeola grauii* (Sykes)	Pond Heron	11	2	69	31	R
98	*Adreola striatus* (Bonaparte)	Little Green Heron	-	-	3	2	
99	*Bubulcus ibis* (Boddaert)	Cattle Egret	23	-	34	19	R
100	*Egretta alba*	Large Egret	-	1	7	-	LM
101	*Egretta garzetta* (Lin.)	Little Egret	3	3	29	-	LM
102	*Nycticorax nycticorax* (Lin.)	Night Heron	-	-	6	-	LM
103	*Ardea cinerea* Gould	Grey Heron	-	-	2	2	LM
	ACCIPITRIDAE (Hawks & Eagles)						
104	*Milvus migrans* Sykes	Pariah Kite	10	6	12	40	LM
105	*Haliastur Indus* (Boddaert)	Brahminy Kite	10	2	10	20	R
106	*Accipiter badius* (Gmel.)	Shikra	2	2	-	1	R
107	*Haliaeetus albicilla* (Lin.)	White bellied Sea Eagle	1	-	-	-	R
	JACANIDAE (Jacanas)						
108	*Metopidius indicus* (Latham)	Bronze winged Jacana	-	3	5	1	R
	RALLIDAE (Rails)						
109	*Amaurornis phoenicurus* (Pennant)	White breasted Water hen	-	16	14	29	BR
110	*Porphyrio porphyrio* (Latham)	Purple Moorhen	1	2	8	-	R
	CHARADRIDAE (Plovers)						
111	*Vanellus malabaricus* (Boddaert)	Yellow wattled Lapwing	9	-	14	4	BR
112	*Vanellus indicus* (Boddaert)	Red wattled Lapwing	8	-	6	2	BR
113	*Charadrius euronicus* (Gmel.)	Little Ringed Plover	3	-	-	-	M
114	*Pluvialis dominica* (Gmel.)	Eastern Golden Plover	7	-	4	2	M
115	*Charadrius leschenaultii* Lesson	Large Sand Plover	-	-	4	-	M
116	*Charadrius alexandricus* (Lin.)	Kentish Plover	-	-	4	-	M

	SCOLOPACIDAE (Sandpipers)						
117	*GalL.ago galL.ago* (Lin.)	Common Snipe	-	-	3	-	M
118	*GalL.ago minima* (Brunnich)	Jack Snipe	-	-	2	-	M
119	*Areneria interpres* (Lin.)	Turnstone	2	-	-	-	M
120	*Calidris alba* (Pallas)	Sanderling	1	1	-	-	M
	COLUMBIDAE (Pigeons, Doves)						
121	*Columbia livia* Strickland	Blue Rock Pigeon	20	9	25	50	R
122	*Streptopelia chinensis* (Gmel.)	Spotted Dove	15	5	6	-	R
123	*Trenon pompadora* (Jerdon)	Grey fronted Green Pigeon	20	-	-	10	LM
	PSITTACIDAE (Parrots)						
124	*Psittacula krameri* (Bechstein)	Rose ringed Parakeet	6	4	4	2	BR
125	*Psittacula cyanocephala* (Lin.)	Blossom headed Parakeet	5	3	2	2	LM
126	*Loriculus vernalis* (Sparrman)	Indian Lorikeet	2	1	-	-	LM
	CUCULIDAE (Cuckoos)						
127	*Eudynamys scolopacea* (Lin.)	Koel	4	8	-	6	R
	CENTROPODIDAE (Coucals)						
128	*Centropus sinensis* Stresemann	Crow Pheasant	4	4	6	18	R
	ANATIDAE (Ducks)						
129	*Nettapus coromandelianus* (Gmel.)	Cotton Teal	-	-	2	-	M
	STRIGIDAE (Owls)						
130	*Athena brama* (Temminck)	Spotted Owlet	2	2	-	-	R
131	*Glaucidium radiatum* (Blyth)	Jungle Owlet	1	1	-	-	R
132	*Otus bakkamoena* Pennant	Collard Scops Owl	2	2	-	1	R
	APODIDAE (Swifts)						
133	*Apus affinis* (J.E.Gray)	House Swift	15	-	20	-	R
134	*Cypsiurus balasiensis*	Palm Swift	10	-	6	-	R
	ALCEDINIDAE (Blue Kingfishers)						
135	*Alcedo atthis* Kleinschnidt	Common	4	3	9	11	R

		Kingfisher					
	DACELONIDAE (Halcyon Kingfishers)						
136	*Halcyon smyrnensis* (Boddaert)	Whitebreasted Kingfisher	6	4	2	12	BR
137	*Pelargopsis capensis* (Lin.)	Stork-billed Kingfisher	-	-	7	1	R
	CERYLIDAE (Kingfishers)						
138	*Ceryle rudis* Whistler & Kinnear	Travencore Pied Kingfisher	1	-	4	-	BR
	MEROPIDAE (Bee eaters)						
139	*Merops phillipinus*(Lin.)	Blue tailed Bee eater	12	-	16	-	R
140	*Merops orientalis* (Latham)	Green Bee eater	4	-	2	-	R
	CORACIIDAE (Rollers)						
141	*Coracias benghalensis* (Lin.)	Indian Roller	2	-	2	-	R
	MEGALAIMIDAE						
142	*Megalaima viridis* (Boddaert)	Small Green Barbet	6	4	-	4	R
143	*Megalaima haemacephala* (Latham)	Crimson Breasted Barbet	2	2	-	-	R
144	*Megalaima rubricaprilla* (Blyth)	Crimson Throated Barbet	1	1	-	-	R
	PICIDAE (Wood Peckers)						
145	*Dinopium benghalensa* Kloss	Lesser Golden Backed Wood Pecker	2	2	-	2	R
	CORVIDAE						
146	*Oriolus oriolus* Sykes	Golden Oriole	1	1	-	2	M
147	*Oriolus xanthornus* (Lin.)	Black Headed Oriole	2	2	-	2	R
148	*Dendrocitta vagabunda* Whistler & Kinnear	Indian Tree pie	4	4	-	2	R
149	*Corvus splendens* Madarasz	House Crow	12	6	8	98	R
150	*Corvus macrorhynchos* Sykes	Jungle Crow	2	4	-	19	R
151	*Dicrurus adsimilis* Viellot	Black Drongo	10	6	8	6	BR
152	*Dicrurus paradiseus* (Lin.)	Racket-tailed Drongo	2	3	2	6	R
153	*Pericrocotus cinnamomeus* (Gmel.)	Small Minivet	-	2	-	-	R

154	*Terpsiphona paradisi* (Swainson)	Paradise Fly Catcher	2	2	-	2	M
155	*Aegithina tiphia* (Gmel.)	Common Iora	3	2	-	1	R
	MUSCICAPIDAE (Trushes, Flycatchers, Chats)						
156	*Saxicoloides fulicata* (Lin.)	Indian Robin	4	3	-	-	BR
157	*Copsychus saularis* Sclater	Magpie Robin	6	4	4	12	R
	STURNIDAE (Mynas, Starlings)						
158	*Acridotheres tristis* (Lin.)	Common Myna	30	15	32	82	R
159	*Sturnus malabaricus blythis* (Jerdon)	Blyth's Myna	30	20	-	40	LM
	SYLVIIDAE (Warblers, Babblers)						
160	*Turdoides striatus* (Jerdon)	Jungle Babbler	8	12	-	-	R
161	*Orthotomus sutorius* (Latham)	Tailor Bird	6	8	-	4	R
	HIRUNDINIDAE (Swallows, Martins)						
162	*Hirundo smithii* Stephens	Wire tailed Swallow	4	-	6	-	R
163	*Hirundo rustica* Scopoli	Eastern Swallow	20	6	30	-	M
	PYCNONOTIDAE (Bulbuls)						
164	*Pycnonotus jocosus* (Gould)	Redwhiskered Bulbul	12	8	2	6	R
165	*Pycnonotus cafer* (Lin.)	Redvented Bulbul	6	4	-	-	R
166	*Pycnonotus leuteolus* (Lesson)	White browed Bulbul	2	2	-	-	LM
	ALAUDIDAE (Larks)						
167	*Eremopterix grisea* (Scopoli)	Ashy crowned Finch Lark	15	-	-	-	R
168	*Mirafra assamica* Blyth	Bush Lark	6	-	-	-	BR
169	*Galerida malabarica* (Scopoli)	Malabar Crested Lark	8	-	-	-	BR
	NECTARINIDAE (Flowerpeckers, Sunbirds)						
170	*Nectarinia lotenia* (Whistler)	Loten's Sunbird	2	2	-	-	R
171	*Nectarina asiatica* (Latham)	Purple Sunbird	4	2	-	2	BR
172	*Nectarina zeylonica* (Hermann)	Purple rumped Sunbird	6	2	-	2	BR
	PASSERIDAE (Sparrows, Wagtails, Pipits, Weavers)						

173	*Passer domesticus* (Jardina & Selby)	House Sparrow	-	-	35	60	R
174	*Motacilla alba* Sykes	White Wagtail	2	-	2	-	M
175	*Motacilla maderaspatensis* Gmel.	Large Pied Wagtail	2	1	-	-	
176	*Anthus novaescelandiae* Eyton	Paddy field Pipit	6	2	8	-	BR
177	*Lonchura punctulata* (Lin.)	Spotted Munia	30	40	52	-	LM
	Total No. of species = 82	**Total No. of individuals**	**486**	**252**	**585**	**617**	
!! R=Resident BR=Breeding Resident M=Migrant LM=Local Migrant							
MAMMALS							
	INSECTIVORA/ SORICIDAE						
178	*Suncus murinus* (Lin.)	Grey Musk Shrew	-	-	-	9	
	CHIROPTERA/ PTEROPODIDAE						
179	*Cynopterus sphinx* (Vahl)	Short-nosed Fruit Bat	6	8	-	-	
180	*Pteropus giganteus* (Brunnich)	Indian Flying Fox	26	16	-	-	
	MEGADERMATIDAE						
181	*Megaderma lyra* E.Geoffroy	Indian False Vampire	2	2	-	-	
	VESPERTILIONIDAE						
182	**Pipistrellus mimus**	Pigmy Bat	4	2	-	2	
	CARNIVORA/ CANIDAE						
183	*Canis aureus* Lin.	Jackal	2	1	-	-	
	MUSTELLIDAE						
184	*Lutra perspicillata* I.Geoffroy	Smooth-coated Otter	1	-	-	-	
	VIVERRIDAE						
185	*Paradoxurus hermaphroditus* (Pallas)	Palm Civet	2	2	-	-	
186	*Viverricula indica* (Desmarest)	Small Indian Civet	3	-	-	2	
	HERPESTIDAE						
187	*Herpestes edwardsii* (Geoffroy)	Common Mongoose	11	3	2	3	

	FELIDAE						
188	*Felis chaus* Guldenstaedt	Jungle Cat	1	-	-	-	
	LAGOMORPHA/ LEPURIDAE						
189	*Lepus nigricollis* F.Cuvier	Black napped Hare	6	-	-	-	
	RODENTIA/ SCIURIDAE						
190	*Funambulus palmarum* (Lin.)	Three striped Palm squirrel	6	9	1	23	
	MURIDAE						
191	*Tatera indica* (Hardwicke)	Indian Gerbille	8	3	9	12	
192	*Bandicota bengalensis*(Gray)	Lesser Bandicoot Rat	-	-	1	5	
193	*Bandicota indica* (Bechstein)	Bandicoot Rat	1	1	2	6	
194	*Rattus rattus* (Lin.)	Common House Rat	8	4	4	16	
195	*Mus musculus* Lin.	House Mouse	6	2	3	10	
	HYSTRICIDAE						
196	*Hystrix indica* Kerr	Indian Porcupine	1	-	-	-	
	Total No. of species =19	**Total no. of individuals**	**94**	**53**	**22**	**88**	

* VM=Veeramala PK=Poomalakkavu KV=Kodakkavayal HS= Human settlement area

ANNEXURE II

FLORA OF THE STUDY AREA

Sl. No.	Name of FAMILY / *Species*	Vernacular name	Hab	E	V K	PK	K V	HS
	RANUNCULACEAE							
1	*Naravelia zeylanica* DC	Vathakkodi	C	E	-	x	-	-
	MAGNOLIACEAE							
	Michelia champaca Lin.	Chempakam	**T**	-	-	-	-	x
	ANONACEAE							
3	*Anona squamosa* Lin.	Aatha	T	-	-	-	-	x
4	*Polyalthia longifolia* (Sonn) Thwaites	Ashokamaram	T	-	-	-	-	x
5	*Polyalthia korinti* H.F& Thomas	Korandi	ST	E	-	x	-	-
6	*Uvaria narum* Wall.	Narumpanal	CS	-	-	-	x	-
	MENISPERMACEAE							
7	*Anamirta cocculus* W. & A .	Polla	CS		x	-	-	-
8	*Cissampelos pareira* Lin.	Malathangi	C		x	x	-	-
9	*Cyclea peltata* Diels.	Padathali	C		x	x	-	x
10	*Tinospora cordifolia* Miers.	Chittamruth	C		-	x	-	x
11	*Tiliocora acuminata* Miers.	Vallikanhiram	C		-	x	-	-
	NYMPHAEACEAE							
12	*Nymphaea stellatta* Will.	Ambal	AH		-	-	x	-
	CAPPARIDACEAE							
13	*Capparis zeylanica* Lin.	Savamnadathi	CS		x	x	-	-
14	*Cleome ruderosperma*		H		-	x	-	x
15	*Cleome viscosa* Lin.	Aryavela	H		x	x	-	-
	VIOLACEAE							
16	*Ionidium suffroticosum* (Lin.) Ging ex DC		H		x	-	-	-

	FLACOURTIACEAE							
17	*Flacourtia montana* Grah.	Charalppazham	ST		x	-	-	-
18	*Hydnocarpus alpina* Wt.	Marotti	T	E	x	x	-	-
	POLYGALACEAE							
19	*Polygala chinensis* Lin.		H		x	-	-	-
20	*Polygala elongata*		H		x	-	-	-
	CARYOPHYLLACEAE							
21	*Polycarpaea corymbosa*	Parappovu	H		x	-	-	-
	CLUSIACEAE							
22	*Brindonia indica* (Roxb.) Jessop	Punampuli	ST		x	-	-	-
23	*Calophyllum inophyllum* Lin.	Punna	T		x	x	-	-
	BOMBACACEAE							
24	*Bombax malabaricum* DC	Ilavu	T		x	-	-	x
	MALVACEAE							
25	*Abelmoschus esculentus* (Lin.) Moenc	Venda	S		-	-	x	-
26	*Abutilon indicum* (Lin.) Sweet		H		-	-	-	x
27	*Hibiscus rosa-sinensis*	Chemparathy	S		-	-	-	x
28	*Hibiscus vitifolius* Lin.	Vaichappuli	H		x	x	-	x
29	*Pavonia odorata* Wild	Kurumthotti	H		-	-	-	x
30	*Sida acuta* Burm.f.	Anakkurunthotti	US		x	x	-	x
31	*Sida cordata*		S		-	x	-	x
32	*Sida rhombifolia* Lin.	Kurunthotti	S		x	x	-	x
33	*Urena lobata* Lin.	Uthiram	US		-	x	-	x
	STERCULIACEAE							
34	*Helicteres isora* Lin.	Itampiri valampiri	S		x	x	-	-
35	*Melochia corchorifolia* Lin.		H		-	-	x	-
	TILIACEAE							
36	*Corchorus acutangulus* Lam.		H		x	-	-	-
37	*Grewia microcos* Lin.	Cherikkotta	ST		x	x	-	x

38	*Triumfetta rhomboidea* Jacq.		S		-	-	x	x
	LACEAE							
39	*Hugonia mystax* Lin.	Mothiravalli	CS		x	-	-	-
	OXALIDACEAE							
40	*Biophytum reinwardtii* E. & Hof.	Mukkutty	H		x	x	-	x
41	*Oxlis corniculata* Lin.	Puliyarila	PH		-	-	x	-
	RUTACEAE							
42	*Aegle marmelos* Cor.	Koovalam	T		-	-	-	x
43	*Glycosmis pentaphylla* (Retz) Cor.	Panal	S		x	x	-	x
44	*Murraya koenigii* Spreng	Kariveppu	ST		-	-	-	x
45	*Xanthoxylum rhetsa* DC	Kumitti	T		x	x	-	x
	MELIACEAE							
46	*Azadirachta indica* A.Juss.	Veppu	ST		-	-	-	x
47	*Aglaea eleagnoidea* (Juss.) Benth.	Punnyava	ST		-	x	-	-
48	*Naregamia alata* W&A	Nilanarakam	H		x	x	-	-
	RHAMNACEAE							
49	*Ziziphus oenoplea* Mill.	Cheruthudali	CS		x	x	-	-
50	*Ziziphus rugosa* Lamk.	Vanthudali	CS		x	x	-	-
	VITACEAE							
51	*Leea indica* (Burm.) Merr.	Nhalu	ST		-	x	-	-
	SAPINDACEAE							
52	*Cardiospermum helicacabum* Lin.	Uzhinja	C		-	-	x	x
53	*Sapindus laurifolius* Wall.	Soppinkaya	T		-	-	-	x
	ANACARDIACEAE							
54	*Anacardium occidentale* Lin.	Kasumavu	T		x	x	-	x
55	*Buchnania lanzan* Sprens.	Kulilavu	T		x	-	-	-
56	*Holigarana arnottiana* Hook.f	Cheru	T	E	x	x	-	-
57	*Lannea coromandelica* (Houtt) Merr.	Karasu	T		x	x	-	-
58	*Mangifera indica* Lin.	Mavu	T		x	-	-	-
59	*Spondias pinnata* (Lin.) Kurz.	Ambazham	T		-	-	-	x

	MORINGACEAE							
60	*Moringa olefera* Lam.	Muringa	T		-	-	-	x
	CONNARACEAE							
61	*Connarus monocarpus* Lin.	Kureel	WC		x	x	-	-
	PAPILIONACEAE							
62	*Abrus precatorius* Lin.	Kunni	C		x	x	-	x
63	*Cajanus indicus* Spreng	Thuvara	H		-	-	-	x
64	*Cajanus scarabaeoides*	Kattupayar	H		-	-	x	x
65	*Clitoria terneata* Lin.	Shankhupushpam	CS		-	-	-	x
66	*Crotalaria striata* DC		US		x	-	x	x
67	*Crotalaria verucosa* Lin.		US		-	-	-x	x
68	*Dalbergia horrda*	Jadavalli	WC		-	x	-	-
69	*Derris scandens* Benth.	Poonhali	WC		x	x	-	-
70	*Desmodium triflorum* DC	Cherupulladi	H		x	-	x	-
71	*Desmodium triquetrum* (Lin.) DC		H		x	-	-	x
72	*Erythrina indica* Lam.	Murikku	T		x	-	-	x
73	*Gliricidia sepium* Kunth *ex* Walp.	Seemakkonna	T		x	-	-	x
74	*Indigofera* sp.		H		-	-	-	x
75	*Mucuna prurita* Hook.	Naykurna	C		x	-	-	-
76	*Phaseolus mungo*	Uzhunnu	H		-	-	x	-
77	*Pseudathria visida* (Lin.) W.f. & Arn.	Moovila	H		x	-	-	x
78	*Pterocarpus santalinus* Lin.	Rakthachandanam	ST		x	-	-	-
79	*Tephrosia purpurea* Pers.	Kozhinjil	US		-	x	x	-
80	*Zornea diphylla* Pers.	Murikootty	H		x	-	x	-
	CAESALPINIACEAE							
81	*Adenanthera pavonina* Lin.	Manchadi	T		x	x	-	-
82	*Bauhinia purpurea* Lin.	Mandaram	ST		-	-	-	x
83	*Cassia alata* Lin.		H		-	-	x	-
84	*Cassia fistula* Lin.	Kanikonna	T		-	-	-	x
85	*Cassia kleinii*		PH		x	-	-	-

86	*Cassia mimosoides*		PH		x	-	-	-
87	*Cassia tora* Lin.	Thakara	US		x	-	-	x
88	*Erythrina variegata*	Murikku	T		x	-	-	x
89	*Hardwickia pinnata*	Mahogany	T		-	-	-	x
90	*Tamarindus indica* Lin.	Tamarind	T		x	-	-	x
	MIMOSACEAE							
91	*Acacia mangium* Willd.	Mangium	T		x	-	-	x
92	*A. intsia* Willd.	Incha	CS		-	x	-	-
93	*A. auriculiformis* Cun. *ex* Benth.	Acacia	T		x	-	-	-
94	*Albizia lebbeck* (L) Benth.	Vaga	T		-	-	-	x
95	*Leucaena leucocephala* (Lamk.) *de* wt.	Subabul	T		x	x	-	-
96	*Mimosa invisa* C.Martius		S		x	-	-	-
97	*Mimosa pudica* Lin.	Thottavadi	PH		x	x	x	x
	DROSERACEAE							
98	*Drosera indica* Lin.	Azhukanni	H		x	-	-	-
	RHIZOPHORACEAE							
99	*Carallia brachiata*(Lour) Merr.	Venkana	T		x	x	-	-
	COMBRETACEAE							
100	*Calycopteris floribunda* Lamk.	Pullanhi	WC		x	x	-	x
101	*Quisqualis indica* Lin.	Kulamarinhi	CS		-	-	-	x
102	*Terminalia paniculata*	Maruthu	ST		x	-	-	-
	MYRTACEAE							
103	*Syzygium caryophyllatum* (Lin.) Alston.	Nhara	ST		x	x	-	-
104	*S. zeylanicum* (Lin.)DC	Poochapazham	ST		-	x	-	-
	LECYTHIDACEAE							
105	*Careya arborea* Roxb.	Pezhu	T		x	x	-	-
	MELASTOMACEAE							
106	*Melastoma malabathricum* Lin.	Athirani	S	E	-	x	x	-
107	*Memecylon malabaricum* Logn.	Kasavu	ST	E	x	x	-	-

108	*Memecylon umbellatum* Burm.f	Kasavu	ST		x	x	-	-
109	*Osbeckia truncata* D.Don. *ex* Wt.&Arn.	Kunhathirani	H		x	-	x	-
	LYTHRACEAE							
110	*Lagerstroemia flos-reginae* Retz	Poomaruthu	T		-	-	x	-
111	*Rotala malabarica* Joseph & Sivaraj		H		x	-	-	-
112	*Rotala malampuzhensis*		H		x	-	-	-
113	*Rotala rotundifolia*		H		-	-	x	-
	ONAGRACEAE							
114	*Ludwigia parviflora* Roxb.		H		-	-	x	-
	CARICACEAE							
115	*Carica papaya* Lin.	Papaya	T		-	-	-	x
	PASSIFLORACEAE							
116	*Passiflora foetida* Lin.		C		x	x	x	x
	CUCURBITACEAE							
117	*Melothraea maderaspatana* (Lin.) Coyn.		C		x	x	-	-
	AIZOACEAE							
118	*Mollugo pentaphylla* Lin.		H		-	-	x	x
	APIACEAE							
119	*Centella asiatica* (Lin.) Urban.	Muthil	PH		-	x	x	x
	RUBIACEAE							
120	*Canthimum didymium* Roxb.	Kara	S		x	x	-	-
121	*Chaselia curviflora* (Wall.) Throites.	Velutha amalpori	S		-	x		
122	*Coffea arabica* Lin.	Kaappi	S		-	-	-	x
123	*Geophila repens* D. Doa	Karimuthil	H		-	x	-	x
124	*Hedyotis biflora*		H		x	-	x	-
125	*Hedyotis corymbosa* (Lin.) Lam.		H		x	-	x	-
126	*Ixora brachiata* Roxb. *ex* DC		S		x	x	-	-
127	*Ixora coccinea* Lin.	Kattuchekki	S		x	x	-	-

128	*Mitracarpus verticillatus* (K.Schum).		H		x	-	x	x
129	*Morinda citrifolia* Lin.	Cherumanhanathi	ST		x	x	-	-
130	*Mussaenda erythrophylla*	Mussaenda	S		-	-	-	x
131	*Mussaenda frondosa* Lin.	Vellila	CS		x	-	-	-
132	*Mussaenda philipica*		S		-	-	-	x
133	*Neonotis nepatifolia* W.H.Lewis		H		x	-	-	-
134	*Oldenlandia auricularia* (Lin.) Schu.		H		x	x	-	-
135	*Oldenlandia corymbosa* Lin.	Parpatakam	H		-	-	x	-
136	*Pavatta indica* Lin.	Pavatta	S		-	x	-	-
137	*Pavatta zeylanica* Gamble	Pavatta	S		-	x	-	-
138	*Randia malabarica* Lamk.	Kara	S		x	x	-	-
139	*Spermacose latifolia* Aubl.		H		-	x	x	x
140	*Spermacose mouritiana* Osea Gideon		H		-	-	x	x
	ASTERACEAE							
141	*Ageratum conyzoides* Lin.	Appa	H		x	x	x	x
142	*Chromolaena odorata* (Lin.) King & Robin.	Communist pacha	S		x	x	x	x
143	*Eclipta alba* (Lin.) Hask	Kayyooni	H		-	x	x	-
144	*Elephantopus scaber* Lin.	Anachuvadi	H		-	x	-	-
145	*Emelia sonchifolia* DC	Muyalchevi	H		x	x	x	x
146	*Eupatorium ayyappana* Vent	Visalyakarani	H		-	-	x	-
147	*Grangia maderaspatana* Poir		H		-	-	x	-
148	*Sphaeranthus indicus* Lin.	Atakamaniyan	H		-	-	x	-
149	*Synedrella nodiflora* (Lin.) Gaertn.		H		-	x	x	x
150	*Vernonea cinerea* Less.	Poovamkurunthila	H		x	x	x	x
	MYRSINACEAE							
151	*Ardisia rhomboidea* Wt.		S		-	x	-	-

	SAPOTACEAE							
152	*Achras sapota* Lin.	Sappota	T		-	-	-	x
153	*Mimusops elengi* Lin.	Elanji	T		-	x	-	-
	OLEACEAE							
154	*Jasminum malabaricum* Wt.	Kattumulla	C	E	x	x	-	-
	APOCYNACEAE							
155	*Allamanda cathertica* Lin.	Kolambi	S		-	-	-	x
156	*Alstonia scholaris* (L.) R.Br.	Ezhilampala	T		x	x	-	-
157	*Catharanthus pusillus* I (Mur.) G. Don		H		-	-	-	x
158	*Catharanthus roseus* (L.) G.Don		H		-	-	-	x
159	*Chonemorpha macrophylla*	Appooppanthati	C		x	-	-	-
160	*Holarrhena pubescens* Wall. *ex* Don	Kudakappala	S		x	x	-	-
161	*Ichnocarpus frutescens* R.Br.	Palvalli	C		x	x	-	-
162	*Nerium indicum* Mill.	Arali	S		-	-	-	x
163	*Parsonsia alboflavescens*	Ezhuthani	C		-	x	-	-
164	*Plumeria rubra* Lin.	Ezhachembakam	T		--	-	-	x
165	*Rauwolfia serpentina* Benth.	sarpagandhi	H		x	x	-	-
166	*Tabernaemontana divaricata* (Lin.) Br.	Nanthyarvattam	S		-	-	-	x
167	*Tabernaemontana heyneana* Wall.	Kunthalappala	S		x	x	-	-
	ASCLEPIADACEAE							
168	*Calotropis gigantea* (Lin.) R.Br.	Erikku	S		x	-	x	-
169	*Gymnema sylvestre* R Br.	Chakkarakkolli	C		x	-	-	-
170	*Hemidesmus indicus* R.Br.	Nannari	PH		x	x	x	x
171	*Hoya wightii* Hook.f		EP		-	x	-	-
172	*Vattakaka volubilis*		C		x	-	-	-
	LOGANIACEAE							
173	*Strychnos aenea* A. W. Hill	Vallikanhiram	C		x	x	-	-
174	*Strychnos nux-vomica* Lin.	Kanhiram	T		x	x	-	-

	MENYANTHACEAE							
175	*Nymphoides crystata* (Roxb) Kuntz	Neythalambal	AH		-	-	x	-
	BORAGINACEAE							
176	*Heliotropium keralensis* Sivar & Mani	Thelkada	H		-	-	x	x
	CONVOLVULACEAE							
177	*Convolvulus arvensis* Lin.		C		x	-	x	-
178	*Cuscuta reflexa*	Moodillathali	P		x	-	-	-
179	*Evolvulus alsinoides* Lin.	Vishnukranthi	PH		x	-	-	-
180	*Ipomoea sepiarea* Koen.	Thiruthali	C			-	-	x
181	*Merremia tridentate* (Lin.) Hall.f.		C		-	-	x	-
182	*Merremia umbellata* Hall.f	Vayara	C		-	-	x	x
	SOLANACEAE							
183	*Physalis minima* Lin.	Mottampuli	H		-	-	x	x
	SCROPHULARIACEAE							
184	*L.dernia* sp.		H		x	-	x	-
185	*Ramphicarpa longiflorous*	Anthippoovu	H		x	-	-	-
186	*Scoparia dulcis* Lin.	Kallurukki	H		-	x	x	x
187	*Sopubia delphinifolia* (Lin.) G.Don		H		x	-	-	-
188	*Striga lutea* Lour		P		x	-	-	-
189	*Torenia bicolor* Dalz		H		-	-	x	-
	LENTIBULARIACEAE							
190	*Utricularia reticulata* SM	Kakkapoovu	H		x	-	x	-
191	*Utricularia graminifolia* Vahl	Kakkappoovu	H		x	-	-	-
	ACANTHACEAE							
192	*Andrographis paniculata*	Nilaveppu	H		x	x	-	x
193	*Asteracantha longifolia* (Lin.) Nees		H		-	-	x	-
194	*Hygrophylla spinosa* T.Anderson	Vayalchulli	H		-	-	x	-
195	*Justicia ekakusuma* Pradeep & Sivaraj		H		x	-	-	-
196	*J. gendarussa* Burm.f.	Vathamkolli	S		-	-	x	-

197	*J. simplex* D.Don		H		x	-	-	-
198	*Lepidagathis keralensis* Madhu & Singh	Venalpacha	PS	E	x	-	-	-
199	*Ruellia tuberosa*		H		-	-	-	x
200	*Strobilanthes* sp.	Kurinhi	S		-	x	-	-
	VERBENACEAE							
201	*Clerodendrum paniculatum* Lin.	Krishnakereetam	S		-	-	-	x
202	*Clerodendrum viscosum* Vent	Vattaparuvalam	S		x	-	x	-
203	*Lantana camera* Lin.	Arippoovu	S		x	x	x	x
204	*Lippia nodiflora* Arich.	Neerthippali	H			-	x	x
205	*Premna latifolia* Roxb.	Moottanari	ST		-	-	-	x
206	*Premna serratifolia* Lin.		ST		x	-	-	-
207	*Stachytarpheta indica* Vahl		US		x	x	x	x
208	*Tectona grandis* Lin.	Thekku	T		x	-	-	x
209	*Vitex altissima* Lin.	Mylellu	T		-	x	-	-
210	*Vitex negundu*	Nechi	S		x	-	-	x
211	*Vitex trifoliate*		S		x	-	-	x
	LAMIACEAE							
212	*Anisomeles malabarica* Br.		H		x	-	-	x
213	*Dysophylla quadrifolia* Benth.		US		x	-	-	-
214	*Dysophylla stellata* Benth.		H		x	x-	-	-
215	*Hyptis suaveolense* Poit		H		x	-	x	X
216	*Leucas linifolia* Spreng	Thumba	H		x	-	x	X
217	*Ocimum americanum* Lin.	Kattuthulasi	US		-	-	-	X
218	*Ocimum gratissimum* Lin.	Ramathulasi	H		-	-	-	x
219	*Ocimum sanctum* Lin.	Krishnathulasi	US		-	-	-	X
220	*Pogostemon paniculatus* Benth.		H		-	-	-	X
	AMARANTHACEAE							
221	*Achyranthes aspera* Lin.	Kadaladi	H		x	x	x	x
222	*Aerva lanata* Juss.	Cherula	H		-	-	x	x

223	*Almania nodiflora* R.Br.	Ponnamkanni	H		-	-	x	x
224	*Alternanthera sessilis* (L.) R.Br.*ex* DC		H		x	-	x	x
225	*A. versicolor*		H		x	x	-	x
226	*Cyathula prostrata* Bl.	Cherukadaladi	PH		x	-	-	-
	ARISTOLOCHIACEAE							
227	*Aristolochia indica* Lin.	Garudakkodi	C		x	x	-	-
	PIPERACEAE							
228	*Peperomia pelucida* (Lin.) H.B&K		H		-	-	-	x
229	*Piper nigrum*. Lin.	Kurumulaku	C		-	-	-	x
	LAURACEAE							
230	*Litsea chinensis* Lamk.	Karotta	ST		-	x	-	x
	SANTALACEAE							
231	*Santalum album* (Lin.)	Chandanam	T		x	-	-	-
	LORANTHACEAE							
232	*Loranthus longiflorus* Desr.	Itthilkanni	P		-	x	-	x
	EUPHORBIACEAE							
233	*Aporusa L.dleyana* (Wt.) Baill	Vetti	T		-	x	-	-
234	*Bridelia retusa* Spreng		T		x	-	-	-
235	*B. scandens* Gehrm.		CS		x	x	-	-
236	*Breynia rhamnoides* (Retz) Muel. Arg.		S		x	x	-	-
237	*Euphorbia hirta* Lin.	Kuzhinakhappala	H		-	-	x	x
238	*Fluggea leucopyrus* Wild		S		x	x	-	-
239	*Jatropha curcas* Lin.	Katavanakku	S		x	-	-	x
240	*J. gossypifolia* Lin.	Katalavanakku	S		x	-	-	-
241	*Kirganelia reticulata* Baill.	Mashikkaya	S		x	x	-	x
242	*Macaranga peltata* Muel.Arg	Vatta	T		x	-	-	x
243	*Mallotus philippinensis* Muel.Arg.	Kurangumanjal	T		-	x	-	-
244	*Manihot utilissima* Pohl	Maracheeni	H		-	-	-	x
245	*Phyllanthus amarus* Schum &	Keezharnelli	H		-	x	x	x

	Thonn							
246	*P. debilis* Klein *ex* Willd		H		-	x	x	x
247	*P. emblica* Lin.	Nelli	T		x	-	-	x
248	*P. simplex* Retz		H		-	-	x	
249	*P. urinarea* Lin.		H		-	x	x	x
250	*Sapium insigne* (Royle) Trim	Kannampotti	ST		x	-	-	-
251	*Sebastiana chamelia* (Lin.) A.Juss.		H		x	x	-	x
	ULMACEAE							
252	*Trema orientalis* (Lin.) Bl.	Nukamaram	T		x	-	-	x
	MORACEAE							
253	*Artocarpus heterophyllus* Lamk.	Plavu	T		-	-	-	x
254	*A. lakoocha* Gambl.	Cheema	ST		-	-	-	x
255	*Ficus racemosa* Lin.	athi	ST		-	-	-	x
256	*F.religiosa* Lin.	Arayal	T		-	-	-	x
257	*F.hispida* Lin.	Parakam	ST		-	x	-	x
258	*F.benghalensis* Lin.	Peral	T		-	x	-	-
259	*F.gibbosa* Bloom		ST		x	-	-	-
	URTICACEAE							
260	*Fleurya interrupta* (Lin.) Gaud	Choriyanam	H		x	-	-	x
261	*Pouzolzia zeylanica* (L) Berm.		H	E	-	x	-	x
	ORCHIDACEAE							
262	*Acampae praemorsa* (Roxb.) Blatt&McCann	Maravazha	EP		x	x	-	x
263	*Bulbophyllum neilgherrens* Wt.	Mookkittakkaya	EP		-	x	-	-
264	*Habenaria diphylla* Dalz. Hook.f		H		x	-	-	-
265	*Malaxis rheedii* SW	Pachilaperumal	H		-	x	-	-
266	*Rhyncostylis retusa* Bl.		EP		-	x	-	-
	ZINGIBERACEAE							
267	*Costus speciosus* Lin.		H		-	x	x	x
268	*Curcuma oligantha*	Kalamukham	H	E	x	x	-	-

	MUSACEAE							
269	*Musa paradisiaca* Lin.	Vaazha	H		-	-	-	x
	DIOSCORIACEAE							
270	*Dioscorea hispida* Dennst.	Podavakizhangu	C		x	-	-	x
271	*D. oppositifolia* Lin.	Kachil	C		-	-	-	x
	AMARYLLIDACEAE							
272	*Curculigo orchioides* Geartn.	Nilappana	H		x	-	-	-
	LILIACEAE							
273	*Asparagus racemosus* Willd.	Sathavari	C		x	x	-	-
274	*Gloriosa superba* Lin.	Menthonni	C		x	x	-	-
	SMILACEACEAE							
275	*Smilax zeylanica* Lin.	Kariyilanji	C		x	x	-	-
	COMELACEAE							
276	*Comela* sp.		H		x	-	x	x
277	*Murdania* sp.		H		x	-	-	-
	BROMELIACEAE							
278	*Ananas comosus* Lin.	Kaithachakka	H		-	-	-	x
	PALMAE							
279	*Areca catechu* Lin.	Kavungu	T		-	-	x	x
280	*Borassus flabellifer* Lin.		T			-	x	-
281	*Calamus rotang* Lin.	Chooral	CS	E	-	x	-	-
282	*Caryota urens* Lin.	Yakshippana	T		x	-	-	-
283	*Cocos nucifera* Lin.	Thengu	T		-	-	-	x
	PANDANACEAE							
284	*Pandanus tectoreus* Soland	Kaitha	S		-	x	x	-
	ARACEAE							
285	*Amorphophalus companulatus* (Schoct)	Chena	H		-	-	-	x
286	*Colocasia* sp.	Chembu	H		-	-	x	x
287	*Cryptocorine reterospiralis* (Roxb.) Kunth		AH		-	-	x	-

288	*Monochoria vaginalis* (Burm.f.) C.Presl.	Karinkoovalam	H		-	-	x	-
289	*Pothos scandens* Lin.	Anapparuva	EP		x	x	-	x
	LEMNACEAE							
290	*Lemna gibba* Lin.		AH		-	-	x	-
	ERIOCAULACEAE							
291	*Eriocaulon palviflorum*	Choothu	H		x	-		
292	*E. cuspidatum*	Choothu	H		x			
293	*E. lancedatum*	Choothu	H		x	-	-	-
	CYPERACEAE							
294	*Cyperus* sp.		H		-	-	x	-
295	*Fimbrystylis* sp.		H		-	-	x	-

T – Tree, S – Shrub, H – Herb, C – Climber, ST- Small Tree, CS - Climbing Shrub

US – Under shrub, WC – Woody Climber, PH – Prostate Herb, P – Parasite, x- Presence

VK – Veeramalakunnu **PK** – Poomalakavu **KV** – Kodakkavayal **HS** – Human Settlement

2.2. Bodiversity of Muthur grama panchayath

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Introduction

The area selected for the biodiversity assessment was Muthoor forming Ward No. 20 of Tirur Municipality, where the landscape elements are rich in biodiversity. The Ward lies on the Southern corner of the Municipality. A tributary of Bharathapuzha called Tirur river flows through the study area.

Materials and methods

The different landscape elements were identified as wood lands (Homestead areas with many trees and shrubs), fallow fields, paddy fields, coconut plantations, sacred grove etc. For convenience of Angiosperm study the different landscape elements were goruped into two broad categories *viz*., homestead and field. From each landscape element, ten sample plots of 20m x 20m were selected by random sampling. The trees present within each plot were identified and counted. Within each plot, a 5m x 5m plot was taken in the centre for enumerating shrubs. Similarly, a 1m x 1m plot was selected inner to the second plot for counting herbs. Plant specimens collected were organized into a h erbarium and subsequently identified. The observations were made in two seasons- during dry season (February, March, April, May, January and February) and during wet season (June, July, August, September, October, November and December). The differences observed in the flora were recorded.

Wth regard to the fauna, certain animal groups such as butterflies, birds, amphibians, spiders and reptiles of the area were monitored. For monitoring butterflies, the students were first trained to identify the common butterflies of Kerala with the help of field manuals in a butterfly identification camp. Transect sampling method was adopted for counting butterflies.

Approximate length of the transect path was fixed as 2 km. Ten plots were selected by random sample. Students walked in the transect slowly in a gap of 59 cm between two students. They stopped after about 100 m walk (120-140 normal walking paces cover about 100 meters on more or less flat ground) and then keenly observed for the presence of butterflies within a radius of 10m. While the actual count was taken, everybody stood in his or her position in order to avoid possible overlap while making the count. The number of individuals of each butterfly species observed was recorded. This procedure was repeated several times both during dry and wet seasons and the data recorded.

The same line transect method was used for monitoring birds also. Here, the approximate length of the transect path was fixed as 2 km. While walking through the transect line, the birds found on the left and right side of the line were recorded, and the habitat type (wood land / Coconut plantation or both) was also recorded. Observations were carried out at monthly intervals. A model data sheet for recording birds is given below:

Data sheet for recording birds
Date of observation :
Time :
Weather conditions : - Sunny / windy/ raining
Habitats covered in sequence:- River sides / woodlands / fallow fields
Length of the transect path: 2 km.

For monitoring amphibians of the locality, 10 x 10 m sample plots plots were selected at every 100m walk and thirty-minute seach was carried out in each plot. Frogs and toads were checked by removing stones, and exploring grasses. The taxa observed were collected and identified with the help of experts.

For observing reptiles, 10x10m plots were selected at every 100m walk. These plots were intermittent with the plots selected for amphibian study. Reptiles were checked by removing stones and on the tree trunks. The reptiles observed were identified in the feild itself by referring identification manuals such as “The book of Indian Reptiles – J.C. Daniel”.

Spiders were observed by the same method as that of amphibians and reptiles. Different species observed were identified and their seasonal abundance was noted. The different types of webs made by various web spinners are also noted. (Photos of different types of webs were taken)

Results

Flora

Angiosperms

A list of plants observed in the study area is given in Table 1. The flora of the study area showed marked difference during dry and wet seasons.

Table 1. List of plants observed in the study

Scientific Name of the plant	Average number	Scientific Name of the plant	Average number
Artocarpus hirsutus	2	*Psidium gujava*	2
Pavatta indica	4	*Mimosa pudica*	6
Mangifera indica	4	*Artocarpus integrifolia*	2
Areca catechu	1	*Tragea involucrata*	6
Cocos nucifera	5	*Holarrhena antidysentrica*	1
Bamboosa arundinacea	10	*Macranga india*	11
Glyricidia maculata	1	*Uvaria narrum*	25
Eupatorium odoratissimus	Numerous	*Euphorbia* sp.	3
Strychnos nux-vomica	5	*Quiscalis indica*	3
Zizyphus jujuba	5	*Santalum album*	3
Clerodendron infortunatum	30	*Cycas revoluta*	
Urena lobata	3	*Jasminum jasminoids*	1
Hibiscus furcutus	1	*Manihott utilissima*	12
Emblica officinalis	14	*Ixora coccinea*	
Mitracarpus verticellatus	8	*Desmodium* sp.	4
Leucas aspera	10	*Solanum torum*	4

Sida acuta	5	*Eclipta alba*	4
Oldenlandia corymbosa	1	*Erva lenata*	10
Sesamum indicum	Numerous	*Boerhavia diffusa*	8
Cassia fistula	2	*Emilia sonchifolia*	2
Tectona grandis	1	*Sida rhombifolia*	6
Anacardium occidentale	2		
Eugenea jambolana	2		
Anona squamosa	4		

Fauna

Arachnidae (Spiders)

During the observation different types spiders making distinct webs like sheet web, Dom web, and funnel web were noticed (Table 2). Besides this the saccular web of social spiders were seen in the bushes of the area. The funnel webs were in plenty during the month of February, March and ApriL. In the month of October, November and December, sheet webs were in abundance. Some specimens collected were identified as speckled band four leg (*Argiope anasuja*) Box long legs (*Crossopriza lyoni*) and Mygalomorph spiders.

Table 2. List of spiders observed

Species	**Average number of individuals observed**
Speckled band four leg	1
Box long legs	2
Mygalomorph spiders	Numerous

***Rhopalocera (Butterflies*)**

A list of butterflies recorded in this study is given in Table 3. An analysis of the data of butterfly monitoring indicates that the number of butterfly species like Tailed Jay (*Graphium agamemnon*), Common silverline (*Spindasis vulcanus*) Danaid egg fly (*Hypolimnas misippus*) Common flouring (*Ypthima huebneri*) Peacock pansy (*précis almana*) psyche (*Leptosia nina*) Nigger (*Orsotrioena medus*) Great egg fly (*Hypolimnas bolina*) are more in wet seasons and species like plain tiger (*Danaus chrysippus*) Blue mormone (*Papilio polymnester*) Malabar Rose (*Pachliopta pandiyana*) were abundant during the dry season.

The species like common crow (*Euploea core core*), Blue Tiger (*Tirumala limnicace*), Red Pierrot (*Telicada nyseus*), Common Pierrot (*Castalius rosimon*), Common Sailor (*Neptis hylas*), Common grass yellow (*Eurema hecabe*), Grey Pansy (*Precis atlites*), Crimson Rose (*Pachliopta hector*), Common leopard (*Phalanta phalanta*) and Common Emigrant (*Catopsilia crecale*) were common during wet and dry seasons.

Table 3. List of butterflies observed from the study area

Common Name	Scientific name	Average number observed from different plots
Tailed Jay	*Graphium agamemnon*	8
Common silver line	*Spindasis vulcanus*	10
Danaid egg fly	*Hypolimnas misippus*	12
Common fourring	*Ypthima huebneri*	8
Peacock pansy	*Junonia almana*	10
Psyche	*Leptosia nina*	15
Nigger	*Orsotrioena medus*	10
Great egg fly	*Hypolimnas bolina*	12
Plain tiger	*Danaus chrysippus*	10
Blue mormon	*Papilio polymnestor*	6
Malabar rose	*Pachliopta aristolochiae*	8
Common crow	*Euploea core*	Numerous

Blue tiger	*Tirumala limniace*	12
Red pierrot	*Talicada nyseus*	8
Common sailor	*Neptis hylas*	8
Common grass yellow	*Eurema hecabe*	Numerous
Grey pansy	*Junonia atlites*	10
Common rose	*Pachliopta hector*	8
Common leopard	*Phalantha phalanta*	8
Common emigrant	*Catopsilia pomona*	Numerous
Southern Bird wing	*Triodes minos*	2
Chocolate pansy	*Junonia lphita*	8
Common cerulean	*Jamides celeno*	8

Amphibia

The collected data of amphibian study revealed that the species *Limnocetes limnocharis* (Indian Cricket Frog) exhibited a great deal of morphological variations and can easily mistaken to be of different taxa and probably misealed the investigators. The species preferred grasses in coconut plantations and in fields than in water. The species *Philantus leucorhinus* is seen on shrubs and bushes. More number of individulas belonging to *Limnocetes* sp. and *Rana tigrina* were observed in fields rather than in coconut plantations (Table 4). So the disappearance of the fields harmfully affects the population of amphibians. More number of the different species was observed during wet season.

Reptilia

We could identify only a few reptiles like snakes, as most of them were nocturnal forms. The identified forms include Buffer striped keel back (*Amphiesama stolata*) and common ptyas. Agamids like common garden lizard (*Calotes versicolor*), including males, females and young ones, the skinks like Brahminy Skink (*Mabuya carinata*) and snake skink (*Lygosoma punctatus*) were also observed (Table 5).

Table 4. List of Amphibians observed

Common Name	Scientific name	Average number observed from different plots
Indian Cricket Frog	*Limononectes limnocharis*	8
Common Indian Toad	*Bufo melanostictus*	4
Skittering Frog	*Euphlyctis cyanophlyctis*	1
Jerdon's Bull Frog	*Hoplobatrachus crassus*	3
Martens Bush Frog	*Philantus leucorhinus*	1
Indian pond frog	*Euphlyctis hexadactylus*	4

Table 5. Data on the reptiles observed during the study

Buffer-striped Keelback	1
Common ptyas	1
Common garden lizard	3
Brahminy skink	2
Snake skink	1

Aves (Birds)

Analysis of the data of birds revealed that birds like Egrets are more common in wet lands and bird like Golden Oriole and Black headed Oriole was more in number during the months of August to April. Birds like Golden backed woodpecker, Treepie etc., prefered coconut plantations than woodlands (Table 6).

Table 6. List of birds observed from the study area

Sl. No.	Species	No. of individuals observed	Preferred habitats / other remarks
1	Cattle Egret	6	Fallow fields
2	Pond heron	23	River, Paddy Field
3	Median Egret	2	Fellow field
4	Little Egret	1	Marshy fields
5	Little Cormorant	6	River
6	White breasted king fisher	15	River side, open field, wood land
7	Small blue king fisher	3	River
8	Stork filled king fisher	3	River
9	Shikra	2	Wood land, ecotone
10	Brahminy kite	2	Gliding above fields & river side
11	White – breasted water hen	2	Vegetated waters of river
12	Palm swift	1	Open field
13	House crow	4	Wood land
14	Jungle crow	8	Wood land, fallow fields
15	Tree pie	3	Wood land
16	Golden backed wood pecker	2	Wood land / coconut plantations
17	Crow pheasant	1	Coconut plantations
18	Jordan chloropsis	1	Woodland border
19	Common Myna	11	In most habitats
20	Jungle Myna	2	River side Field
21	Black headed Oriole	2	Woodland / plantations
22	Jungle owlet	2	River side thicket
23	Black Drongo	2	Open field
24	Small Green Barbet	2	Woodland side
25	White headed Babbler	12	Fallow field side

26	Purple rumbed sun bird	12	In most habitats in pendanus growth
27	Purple sun bird	3	Pundanus growth
28	Tailor Bird	2	Wood land
29	Mag pie Robin	5	River side thicket
30	Paddy field pipit	1	Fallow field

Knowledge of local people on biodiversity

Traditional inhabitants possess vast knowledge on biodiversity. Traditional knowledge was collected by conducting a survey and the information generated has been given in Table 7. Most of these are of medicinal value. It has also been found that, the wild plants *Alternamthera sessilis, Boerhavia diffusa, Tragea involucrate* and *Cassia tora* could be used as leafy vegetables.

Table 7. Traditional use of certain plants in the study area.

Kampferia galanga: - Tuber is used against different diseases.
Avicinia officials: - The flower and leaf is used by locals for controlling fowl ticks. It has a bad smell.
Emilia sonchifolia:- Juice is used by locals against worm troubles.
Eclipta alba:- Used with oil for hair growth and for treatment against night bL.dness.
Lippia nodiflora:- Leaf is used as a medicine.
Kurkkuligo orchioides:- Leaf mixed with neem oil is used for controlling oedema.
Tragea nvolucrata:- Used as a leafy vegetable and also as a Thali against head louse. (*Pediculus humanus*)
Vernonia cinerea:- The juice of the plant is used against eye diseases. It is also used to cure wounds in the eye.
Glycosmis pentapylla:- Root of the plant is used gainst stomachache and other stomach problems.
Mimosa pudica: - Juice of the entire plant is used for diabetics.
Phyllanthus riroou: - Juice of entire plant is used against jauntice.
Biophytom sensiva:- Leaf is used against dysentry.
Cida acuta:- Used against paralysis.
Cycas:-Seeds are used as food
Sida acuta:-Used as a medicinal plant.

Summary

In the case of Muthur Grama Panchayath, 45 species of plants covering trees, herbs, and shrubs were recorded which included various ornamental and medicinal plants. Data pertaining to traditional use of various species as vegetables or medicines were also generated. With regard to the fauna, different types of spiders; 24 species of butterflies, six of amphibians, five of reptiles and 30 of birds have been recorded. The spiders were identified as speckled band four leg (*Argiope anasuja*), Box long legs (*Crossopriza lyoni*) and Mygalomorph. Among butterflies, the Common crow (*Euploea core core*), Blue Tiger (*Tirumala limnicace*), Red Pierrot (*Telicada*

nyseus), Common Pierrot (*Castalius rosimon*), Common sailor (*Neptis hylas*), Common grass yellow (*Eurema hecabe*), Grey pansy (*Precis atlites*), Crimson rose (*Pachliopta hector*), Common leopard (*Phalanta phalanta*) and the Common emigrant (*Catopsilia crocale*) were common during wet and dry seasons. Among amphibians, *Limnocetes limnocharis* (Indian Cricket Frog), which preferred grasses in coconut plantations and in fields than in water, exhibited a great deal of morphological variations. Similarly, more number of individulas belonging to *Limnocetes* sp. and *Rana tigrina* were observed in fields rather than in coconut plantations. Therefore, the disappearance of the fields may harmfully affect their population. Only a few reptiles like the Buffer striped keel back (*Amphiesama stolata*), the common garden lizard (*Calotes versicolor*), the Brahminy Skink (*Mabuya carinata*) and snake skink (*Lygosoma punctatus*) had been recorded. Among birds, Egrets were more common in wetlands. Certain species like the Golden Oriole, Black headed Oriole was more in number during the months of August to April.

Acknowledgements: Thanks are dur to Dr. C.Radhakrishnan, Joint Director, ZSI, Calicut, for assistance in animal species identification.

2.3. Biodiversity of Paliyamangalam, Ayilamudichi hills (Nemmara)

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Introduction

Nemmara is basically a village having extensive areas under agricultural crops. The area is also rich in natural forests and plantations. As a result, the area offers diversified landscapes with rich biodiversity. Previous studies carried out in various locations in and around this area have shown that this area is rich biodiversity particularly of rare, endemic and protected forms.

The study was carried out in the Paliyamangalam and Ayilamudichi hills (Fig. 1) of Ayiloor Panchayath, approximately 8 km away from Nemmara town. The place is bordered by streams and rivers and hilly areas and enriched with natural vegetation of grasslands, forest, and monoculture of paddy, rubber and also barren rocky land. The total area of it is around nine km^2 and the elevation ranges with a height of 30- 50 m from the mean sea level. The area selected for investigation is under Western Ghats is one of the hills of vast forest and grasslands encircled by natural streams. Although the place experience a tropical climate - being warm and humid during most of the year with the mean temperature ranging from 20^oC to 28^oC, the higher elevations experience subtropical climates and on occasions frost. The climatic conditions in the area vary with the altitude. The annual rainfall is 2500 mm and above, has been recorded.

Materials and methods

The area for the study was selected on the basis of a preliminary reconnaissance survey to evaluate the relative faunal richness of of the area prior to selection of study sites. As it was not possible to study the whole area under the village, specific wards (Ward No. 13 and 14) having diverse ecosystems were selected.

After selecting the study area, the team of investigators and students visited the place for identification of different ecosystems and to chart out the programme. The investigating team was divided into four groups each consisting of of ten students and a faculty member. Each group made intensive survey of fauna and flora available in a minimum of two different plots. Quadrate sampling method was used for species abundance studies. Plants collected during the study were brought to the laboratory and identified with the help of floral treatises. Herbarium sheets were prepared and maintained in the herbarium. Data collected during the surveys by different teams were pooled and analysed.

Standard collection method was followed for the different animal fauna. Indirect methods such as detection by sound were also resorted to, especially for birds. Insects were collected mainly using sweep nets or manually. They were preserved and subsequently identified. The data collected by different teams during different visits were pooled. Photographs were taken in their natural habitat for birds and mammals.

Classification of the sampling site

The study site identified for investigation was divided into eight different plots (P-1 to P-8) based on the type of vegetation and general habitat. The site included residential area, agricultural area, rubber plantations, paddy fields, grass lands, banks of rivers and streams, forest, rocky areas, barren land etc. (Table 1).

Table 1. Description of plots identified for investigation

Sl. No.	Plot No.	Description about the plot
1	P-1	Residential
2	P-2	Cultivated crops
3	P-3	Rubber plantation (Fig. 2)
4	P-4	Paddy field (Fig.3)
5	P-5	Grass land
6	P-6	Rocky land
7	P-7	River, streams, ponds (Fig. 4)
8	P-8	Forest (Moist deciduous)
9	P-9	Rivers and ponds

Results

Floral diversity

1.Fungi and Lichens:

Fungi *viz., Pleurotus florida, Irpex* sp., *Lentinus squarosulus, Microporus* and crustose lichens (adhering on rocks and tree trunks) have been identified from forest and plantations in the study area (Table 2). Lichens were particularly abundant on rocks in the forest ecosystem.

Table 2. Fungi and Lichens in different ecosystems in Ayiloor Panchayath

P1-P9: Plots 1-9

2. Bryophytes:

Bryophytes viz. *Funeria* sp. and *Cyathodium* could be identified in grassland and forest ecosystems as well as plantations and homesteads (Table 3)

Table 3. Bryophytes in different ecosystems in Ayiloor Panchayath

No.	Name	Ecosystems								
		P1	**P2**	**P3**	**P4**	**P5**	**P6**	**P7**	**P8**	**P9**
1	*Funaria* sp.									
2	*Cyathodium* sp.					1				

P1-P9: Plots 1-9

3.Pteridophytes

Pteridophytes viz., *Selaginella* (two species), *Adiantum, Dryopteris, Lygodium scandens* and *Dryneria* could be identified from forest and grassland ecosystems. Azolla and *Marselia minuta* were collected from Paddy fields and *Salvinia* from meadows. (Table 4)

P1-P9: Plots 1-9

4. Dicots

Dicots represent the most abundant vegetation in most of the ecosystems. More than 200 species could be collected from the area (Tables 5 to 13).

Table 5. Dicot plants recorded from homesteads at Ayiloor Panchayath

Name of plant	**No. of plants**
Biophytum sensitivu DC.	10
Eupatorium odoratum	2
Knoxia zeylanica Lin.	3
Eragrostis japonica Trin.	2
Scoparia dulcis Lin.	14
Themeda triandra Forsk.	19
Synedrella nodiffora Gaertn.	18
Vernonia cinerea Less.	13
Aegeratum conyzoides Lin.	17
Phyllanthus urinaria Lin.	1
Alternanthera sp.	8
Leucas aspera sp.	1
Euphorbia hirta	4
Cardiospermum helicacabum Lin.	5
Dioscoria bulbifera	1
Ocimum sanctum Lin.	7
Cyperus rotundus	7
Sida acuta Burn.	11
Corchorus capsularis Lin.	5
Commelina benghalensis Lin.	4
Urena lobata	2
Pouzolzia indica Gaud.	3

Table 6. Dicot plants in Coconut plantations at Ayiloor Panchayath

Table 7. Dicot plants in Rubber plantations at Ayiloor Panchayath

Name	**No. of plants per unit area ($3m^2$)**
Ichnocarpus frutescens R.Br.	6
Ruellia prostrata Poir.	3
Commelina benghalensis Lin.	12
Sida acuta Burm. f..	12
Synedrella nodiflora Gaertn.	14
Vernonia cinerea (Lin.) Less.	3
Hyptis suaveolens Poit.	8
Phyllanthus amarus Schum & Thonn.	7
Clerodendron philippinum	12
Biophytum sensitivum DC.	4
Glycosmis pentaphylla Corr.	9
Mimosa pudica Linn.	14
Morinda tinctoria	1
Cardiospermum helicacabum Lam.	1
Achyranthes aspera Lin.	2
Aristolochia indica Lin.	1
Murraya koenigii (Lin.) Spreng.	2
Spatholobus roxburghii Benth.	2
Pouzolzia indica Gaud.	3
Mucuna prurita Hook.	3
Tylophora indica	3
Phyllanthus urenaria Lin.	5
Sida rhombifolia Lin.	8
Thunbergia errecta	4

Sida cordata	2
Calycopteris floribunda Lam.	2
Vernonia cinerea (Lin.) Less.	2
Flurya interrupta	5
Phyllanthus amarus Lin.	4
Biophytum sensitivum DC.	3
Artocarpus integrifolia Lin.	4
Adiantum	4
Spilanthus acmella Murr.	6
Peperomia pellucida Lin.	2
Ipomoea bona-nox Lin.	4
Terminalia arjuna (Roxb.) Wight & Arn.	3
Lantana camara Lin.	4
Anamirta cocculus W. & A.	3
Eupatorium odoratum	6
Crotalaria mysorensis Roth.	3
Cyperus rotundus Lin.	5
Plumbago zeylanica Lin.	8
Cassia tora Lin.	5
Ficus religiosa Lin.	2
Casearia wynadensis Bedd.	3
Scoparia dulcis Lin.	3
Flurya interrupta Gaud.	3
Morinda tinctoria Roxb.	4
Chukrasia tabularis A-Juss.	3
Annona squamosa	5
Tinospora cordiflora Mierr.	4
Sida rhombifolia Linn.	5
Spermacoce ocymoides Burm.	4
Commelin.a benghalensis Lin.	4
Leucas aspera (Willd.) Spr.	25

Vernonia cineria (Lin.) Less.	20
Emelia sonchifolia (Lin.) DC.	15
Biophytum candolleanum Wt.	5
Eupatorium odoratum	20
Mimosa pudica Lin.	70
Sphaeranthus indica Lin.	9
Sesbania sesban	10
Santalum album	3
Amorphophallus paeoniifolius (Dennst.) Nicolson	20
Lantana camara Lin.	1

Table 9. Dicot plants in meadows of Ayiloor Panchayath

Name	**No. of plants per unit area ($3m^2$)**
Cassia tora Lin.	2
Aerva lanata (Lin.) Juss.	12
Tridax procumbens Lin.	56
Eupatorium odoratum	52
Leucas aspera (Willd.) Spr.	35
Vernonia cinerea (Lin.) Less.	25
Ocimum basilicum Lin.	2
Lantana camara Lin.	7

Table 10. Dicot plants in grasslands of Ayiloor Panchayath

Name	No. of plants per unit area ($3m^2$)
Emblica officinalis Gaertn.	2
Themeda triandra Forsk.	1500
Ficus religiosa Lin.	4
Steriospermum chelanoidus Cl.	13
Randia uliginosa DC.	1
Santalum album Lin.	3
Dalbergia latifolia Roxb.	2
Ziziphus jujuba Lam.	1
Celastrus paniculeta Willd.	1
Xylia xylocarpa Taub.	10
Hemidesmis indicus R.Br.	15
Justicia simplex D.Don.	200
Naregamia alata W. & A.	20
Eupatorium odoratum	250
Allmania nodiflora R.Br.	100
Hedyotis errecta	50
Ficus microcarpa	5
Dalbergia lanceolaria Lin.f.	5
Crotalaria mysorensis Roth.	10
Ichnocarpus frutescence R.Br.	50
Aristolochia indica Lin.	5
Passiflora foetida Lin.	10
Mallotes philippinensis M.Arg.	1
Tectona grandis Lin.f.	1

Table 11. Dicot plants in Natural Forest of Ayiloor Panchayath

Borreria hispida K.Sch.	27
Cleistanthus collinus Benth.	3
Sopubia delphinifolia G.Don.	123
Dioscoria alata Lin.	7
Embelia tsjeriam DC	5
Schleichera serrata W.&A.	1
Plectronia sp.	2
Centrantherum molle Benth.	15
Celastrus paniculata Willd.	1
Cochlospermum religiosum	1
Garuga pinnata Roxb.	3
Santalum album Lin.	7
Celastrus paniculata Willd.	2
Stereospermum chelanoides Cl.	2
Firmiana colorata R.Br.	14
MolL.aria trichocarpa	8
Tinospora sinensis	*12*
Ficus microcarpa	3
Holarrhena antidysenterica Wall.	2
Antidesma acidum	5
Zornia diphylla Pers.	Several
Ficus arnottiana Miq.	3
Tephrosia sp.	Several
Exacum bicolor Roxb.	Several
Desmodium triangulare	Several
Dalbergia lanceolaria Lin.f.	2
Crotalaria mysorensis Roth.	Several

Clerodendron serratum	1
Passiflora foetida Lin.	Several
Pennisetum polystachyom Sch.	Several
Naregamia alata W. & A.	Several
Pouzolzia indica Gaud.	Several
Hemidesmis indicus R.Br.	Several
Hyptis suaveolens Poit.	Several
Biophytum sensitivum DC.	Several
Xylia xylocorpa Taub.	16
Dalbergia latifodia Roxb.	3
Bombax malabaricum DC.	6
Mimosa pudica Lin.	Several
Tinospora cordifolia Miers.	17
Sebastiana chamaelia M.Arg.	Several
Helicteres isora Lin.	35
Gossypium arboreum	8
Leea sinensis	5
Tectona grandis Lin.f.	4
Terminalia arjuna W. & A.	19
Terminalia paniculata Roth.	11
Mallotus phillippinensis M.Arg.	2
Ichnocarpus frutenscens R.Br.	Several
Calycopteris floribunda Lam.	3
Peperomia pellucida H.B.K.	Several
Naravelia zeylanica DC.	
Borreria hispida K.Sch.	27
Cleistanthus colL.us Benth.	3
Sopubia delphinifolia G.Don.	123
Dioscoria alata Lin.	7
Embelia tsjeriam - Cottam, A.DC.	5
Schleichera serrata W.&A.	1

Plectronia sp.	2
Centrantherum molle Benth.	15
Celastrus paniculata Willd.	1
Cochlospermum religiosum	1
Garuga pinnata Roxb.	3
Santalum album Lin.	7
Celastrus paniculata Willd.	2
Stereospermum chelanoides Cl.	2
Firmiana colorata R.Br.	14
Mollinaria trichocarpa	8
Tinospora sinensis	*12*
Ficus microcarpa	3
Holarrhena antidysenterica Wall.	2
Antidesma acidum	5
Zornia diphylla Pers.	Several
Ficus arnottiana Miq.	3
Tephrosia Pers.	Several
Exacum bicolor Roxb.	Several
Desmodium triangulare	Several
Dalbergia lanceolaria Lin.f.	2
Crotalaria mysorensis Roth.	Several
Clerodendron serratum spr.	1
Passiflora foetida Lin.	Several
Pennisetum polystachyom Sch.	Several
Naregamia alata W. & A.	Several
Pouzolzia indica Gaud.	Several
Hemidesmis indicus R.Br.	Several
Hyptis suaveolens Poit.	Several
Biophytum sensitivum DC.	Several
Xylia xylocorpa Taub.	16
Dalbergia latifolia Roxb.	3

Bombax malabaricum DC.	6
Mimosa pudica Lin.	Several
Tinospora cordifolia Miers.	17
Sebastiana chamaelia M.Arg.	Several
Helicteres isora Lin.	35
Gossypium arboreum	8
Leea sinensis	5
Tectona grandis Lin.f.	4
Terminalia arjuna W. & A.	19
Terminalia paniculata Roth.	11
Mallotus phillippinensis M.Arg.	2
Ichnocarpus frutenscens R.Br.	Several
Calycopteris floribunda Lam.	3
Peperomia pellucida H.B.K.	Several
Naravelia zeylanica DC.	1

Table 12. Dicot plants in riverine system of Ayiloor Panchayath

Name	No. of plants per unit length of river
Paspalum Lin.	Many
Sesuvium portulaccastrum Lin.	Many
Urena lobata Lin.	25
Mitracarpus verticellatus	10
Phyllanthus urinaria Lin.	20
Leucas aspera Lin.	5
Dactyloctenium aegypticum Beav.	Many
Duranta plumieri Jacq.	Many
Tragia involucrata Lin.	10
Azadiracta indica A.Juss.	5
Elephantopus scaber Lin.	5
Santalum album Lin.	10
Hyptis suaviolens	5
Cissus pallida Planch.	1
Ipomoea bona-nox Lin.	Many
Biophytum sensitivum DC.	20
Flurya interrupta	Many
Glycosmis pentaphylla Corr.	Many
Aristolochia indica Lin.	10
Colocasia antiquorum Schott.	Many
Piper nigrum Lin.	25
Plumbago zeylanica Lin.	20
Dioscoriapentaphylla Lin.	1
Cayritia pedata Juss.	2
Ploygonum barbatum Lin.	5
Dioscoria bulbifera Lin.	10
Lantana camara Lin.	10
Ludwigia parvi flora Roxb.	20

Dioscoria alata Lin.	20
Clerodendoron infortunatyum Lin.	20
Peperomia pellucida H.B.K.	3
Gloriosa superba Lin.	10
Jatropha curcas Lin.	2
Ficus hispida L.f.	2
Musa paradisiaca Lin.	1

Table 13. Dicot plants in or associated with pond ecosystem of Ayiloor Panchayath

Name	**No. of plants per unit**
Leucas aspera Lin.	20
Borreria diffusa W.	5
Cleome viscosa Lin.	10
Physalis minima Lin.	4
Ageratum conyzoibes Lin.	5
Elephontopus scaber Lin.	10
Flurya interrpta Gaud.	Several
Vernonia cinerea Less.	5
Calotropis gigantea	Several
Oldenlandia umbellata Lin.	Several
Ocimum sanctum Lin.	Several
Ipomoea bona-nox Lin.	Several
Synedrella nodiflora Gaertn.	Several
Lantana camara Lin.	5
Cassia tora Lin.	Many
Emilia sonchifolia DC.	Several

5.Monocots

Among monocots grasses were the dominent vegetation in most of the ecosystems. Cyperaceae, Arecaceae and Zingiberaceae were also represented by a few species (Table 14).

Table 14. List of monocot plants recorded

	Ecosystem								
Name	1	2	3	4	5	6	7	8	9
Eragrostis japonica Trin.	1							2	
Themeda triandra Forsk.	24					1500			
Cyperus rotundus	21	6	5	42	30				25
Commelinna benghalensis Lin.	2	8					10		
Kyllinga brevipes		10						5	
Oplismenus compositus Bave									
Amorphallus paennifolius			5						
Cyanodon dactylon				55	20			Several	1
Pennisetum polystachyon						1200			
Caryota urens						1			1
Paspalum								Several	1
Curcuma							1		

P1-P9: Plots 1-9

Faunal diversity

1.Invertebrates

Spiders: The paddy fields were rich in spider fauna generally enriched with different types of spiders (Table 15). They were collected and identified as mentioned in the table.

Table 15. Data on spiders collected from different plots

No.	**Name**	**P-1**	**P-2**	**P-3**	**P-4**	**P-5**	**P-6**	**P-7**	**P-8**	**Total**
1	Yellow & Brown	2	1	3				1	1	8
2	Aranea	5	8	2	12	8	2	10	8	55

P1-P9: Plots 1-9

Beetles: Beetles were very common in these areas. Data collected is given in Table 16.

Table 16. Data on the beetles collected from different plots

No.	Name	P-1	P-2	P-3	P-4	P-5	P-6	P-7	P-8	Total
1	Rhinoceros beetle	2	3	1					1	7
2	Lady bird beetle					5				3
3	Click beetle					1				1
4	Dung roller beetle sp.1		2			1				3
5	Dung roller beetle sp. 2	1	3	1	4					9
6	Unidentified sp.2	1	5						2	8
7	Unidentified sp. 1	2	5	2	1	1		1	3	5

P1-P9: Plots 1-9

Butterflies: The team collected 37 species of butterflies from the specific field. Plot-vise data are presented in Table 17. The availability of butterflies is related to not only adult feeding habitat but also larval food plants.

Table 17. List of butterflies observed in different plots

No.	Name	P-1	P-2	P-3	P-4	P-5	P-6	P-7	P-8	Total
1	*Jamides celeno*					8				8
2	*Eurema hecabe*		1			8	2			11
3	*Catopsila* sp.	4			1					5
4	*Eurema hecabe*	2						2		4
5	*Leptosia nina*	8						3	2	13
6	*Cepora nerissa*	4								4
7	*Thaduka multicaudata*	2			1					3
8	*Phalanta phalanta*	1								1
9	*Catopsila pomona*		9						2	11
10	*Surendra quercetorum*		10						3	13
11	*Pachliopta hector*		1							1
12	*Graphium agamemnon*		1	20		1			8	30
13	*Danais chrysippus*		1							1
14	*Castalius rosimon*		1		4				2	4
15	*Neptis hylas*				1					1
16	*Ypthima baldus*				1					1
17	*Tirumala limniace*				1					1
18	*Ypthima huebneri*					14				14
19	*Sarengesa desahara*					8				8
20	*Euploea core*					3				3
21	*Phalanta phalanta*					2				2

22	*Appias albina*					4				4
23	*Phalanta phalanta*					1				1
24	*Hebomoia glaucippe*					1				1
25	*Mycalesis perseus*					1				1
26	*Cepora* sp						2			2
27	*Danaus genuita*						4			4
28	*Papilio liomedon*						5			5
39	*Junonia lemonias*					2				2
30	*Euploea core*					3				3
31	*Spalgis epius*					1				1
32	*Ixias pyrene*					1				1
33	*Graphium agamemnon*					1				1
34	*Celaenorrhinus leucocera*					1				1
35	*Badamia exclamationis*					1				1

P1-P9: Plots 1-9

Molluscs: Very few studies have been made on the few observations in this area have paid attention to aquatic invertebrates including mollusks (Table 18). A decline in the diversity of aquatic invertebrates has also been noticed elsewhere in these areas under investigation. Habitat loss and pesticide pollution may be attributed as reasons for the decline of aquatic insects and molluscs. The plot No. 1 showed very less number of molluscs except in the case of land snails which might be due to the human interference in these parts.

Table 18. Data on molluscs recorded from various plots

No.	**Name**	**P-1**	**P-2**	**P-3**	**P-4**	**P-5**	**P-6**	**P-7**	**P-8**	**Total**
1	Land snails	8	2	2						12
2	Pila				12					12
3	Fresh water mussel							1		1

4	Achatina	2	1							3
5	Vaginulus	1								1

P1-P9: Plots 1-9

Annelids form another important group of animal observed in these areas. The aquatic system is with leaches in certain areas. The residential areas are enriched with two varities of common earthworms also (Table 19).

Table 19. Data on annelids recorded from various plots

No.	Name	P-1	P-2	P-3	P-4	P-5	P-6	P-7	P-8	Total
1	Haemadipsa								2	2
2	Hirudinaria							3		3
3	Earthworm	12	2	1	2			2		19

P1-P9: Plots 1-9

Fishes: Eight species of primary and secondary freshwater fishes were recorded in the different plots as listed in the Table 20. Patterns of distribution and diversity of freshwater fishes are rather poorly understood. Despite the human interference of freshwater habitats and pesticide pollution, there were still some discernable patterns of fish distribution and diversity.

Table 20. Data on fishes recorded from various plots

No.	Name	P-1	P-2	P-3	P-4	P-5	P-6	P-7	P-8	Total
1	Anabas							5		5
2	Clarias							2		2
3	Ophiocephalus							2		2
4	Aplochilus							6		6
5	Common eel							2		2
6	Saccobranchus							1		1
7	Oxygaster							1		1

P1-P9: Plots 1-9

Amphibia: *Rana* spp., *Bufo* spp., *Hyla* spp. and *Cacopus* spp. were the common frogs recorded. Residential areas and forests contained good population of these species.

Table 21. Data on the amphibia recorded from various plots

No.	Name	P-1	P-2	P-3	P-4	P-5	P-6	P-7	P-8	Total
1	*Rana* spp.	1			4			3	2	10
2	*Bufo* spp.	2				2		2	5	11
3	*Hyla* spp.	3							8	11
4	*Cacopus* spp.	2		2					2	6

P1-P9: Plots 1-9

Reptiles: Several species of snakes and lizards were recorded. Among lizards, dwarf geckoes and skinks had the maximum number of endemic species. Higher species diversity was observed in the moist deciduous forests (Table 22). The number of reptilian species was found to be negatively correlated with altitude, but positively correlated with slope. Presence of herbs, fallen logs favoured the survival of reptilian species.

Table 22. Data on the reptiles recorded from various plots

No.	Name	P-1	P-2	P-3	P-4	P-5	P-6	P-7	P-8	Total
1	Calotes	2			1		1		6	10
2	Mabuya	2				1	1			4
3	Varanus								1	1
4	Gecko	6						2	4	12
5	Ptyas	1							1	2
6	Hydrophis							2		2
7	Lizard				1				1	1
8	Viper					1				1
9	Cobra						1			1
10	Chamaeleon		1							1

P1-P9: Plots 1-9

Birds: Of all organisms, birds are the best studied under vertebrata as that of butterflies under invertebrates. The predominant land birds and aquatic birds observed in the site of investigation are listed in the Table 23. Human interference of forests has led to the disappearance of birds locally. However, when large landscapes are considered, species richness of the avifauna has remained stable. Whereas the floristic composition of woody plants determines the nature of bird species that might inhabit a forest, bird species diversity may be inversely related to woody plant species diversity, locally. Monocultures may support an assemblage of birds as diverse as (or even more diverse than) evergreen forests. However, birds that inhabit the monocultures are often generalist habitat users drawn from a wide range of neighboring habitats. Forest areas may provide habitats to a number of species of birds.

Table 23. Data on the birds recorded from various plots

No.	Name	P-1	P-2	P-3	P-4	P-5	P-6	P-7	P-8	Total
1	Malabar grey hornbill								1	1
2	Rufous babbler	1	2							3
3	Crimson-backed sunbird	1								1
4	Pavo			1						1
5	Wagtails	2						4	2	8
6	Red Whiskered Bulbul	2							2	4
7	Sparrow	6								6
8	Swift	4								4
9	Barbet	2				1			2	5
10	Cuckoo (Koel)		1							1
11	Indian roller				1					1
12	Magpie robin	1	1			1				3
13	Common myna	4	3	2	2	5				16
14	White breasted Kingfisher							2		2
15	Small green bee eater		1			2			2	5
16	Spotted dove						3			3
17	Swallow	1								1
18	Little egret				11					11
19	Cattle Egret	2				4				6
20	House sparrow	3								3
21	Pond heron	2			12					14
22	Brahmini kite				1					1
23	House crow	18	4	1	5	2				30

Mammals: Data on the small mammals in the area under study are given in Table 24.

Table 24. Data on the small mammals in various plots in the study area

No.	Name	P-1	P-2	P-3	P-4	P-5	P-6	P-7	P-8	Total
1	Bat								N	N
2	Herpestes		N						N	N
3	Rats	2			2		1			4
4	Rabbit				2					2
5	Spotted deer								2	2
6	Wild cats								1	1
7	Mongoose			1					1	2
8	Civet	1								1
9	Sambar deer								1	1

N- Numerous; P1-P9: Plots 1-9

The distribution herbivores such as deer, rabbits, rats etc., have been observed. The herbivores were observed near the streams in plantations and forests. The studies have frequently addressed the smaller cats and lesser carnivores. Estimates of home ranges of civets and mongooses in the Western Ghats have suggested that the Indian Grey Mongoose (*Herpestes edwardsii*) and the Small Indian Civet (*Viverricula indica)* are becoming extremely restricted in distribution.

Conclusions

The study area was rich in animal and plant diversity. Among plants, the dicots represented the most abundant vegetation in terms of community biodiversity. Pollution and human intervention have adversely affected the flora and fauna, particularly the insects, fishes, birds and mammals. Appropriate site amelioration programmes are required to conserve the biodiversity that is still surviving in this area.

2.4. Biodiversity of Karoor Grama Panchayat (Kottayam District)

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Introduction

The study was carried out in the Aazhiveli-Karoor Neerthadams (river basins) situated in the north central part of Karoor Grama Panchayat in Meenachil Taluk of Kottayam District, Kerala. It comprises of a major portion of Karoor ward, the western portion of Nechippuzhoor ward, portions of Idanad, Karoor, and Ponad wards of Karoor Panchayat and Chakkampuzha portion of Ramapuram Panchayat. The area is bordered by Payappar Neerthadam in the east, Valavoor Neerthadam in the west, Uzhavoor Block in the north and Pala Municipality in the south.

Fig. 1. A view of *Lalam Thodu* in January

Topographically the area is much undulating with small depressions and hills. Some parts are with granite and sedimentary rock formations. The soil type is sandy in the plains whereas it is with rocky boulders in the hillsides and with black soil on the hilltops. Lalam River (Fig.1) and Aazhivelithode are the main water sources. Aazhivelithode with its many streamlets joins with Lalam River. There is a large pond of 60m X 40m called *Chirakkarakkavu kulam*. The main attraction of the river basin is the presence of a Sacred Grove called *Pathi* (Fig. 2) which is dense with tall trees of *Tetrameles nudiflora, Bombax ceiba* and *Hopea parviflora*. Another fragment of forest patch in the area is *Elapozhuthu kavu*, which is also dense, with tall trees. The main agricultural crops in the area are rubber, paddy, plantain, tapioca, black pepper, cocao, coconut, ginger and areca. No studies have been made in the past on the biodiversity of this area. The major group of flora covered in this study included the flowering plants and among fauna, the mammals, birds, butterflies and fishes.

Fig. 2. *Pathi kavu,* the sacred grove in the study area

Materials and methods

Flora

Angiosperms were surveyed separately according to their life forms as trees, shrubs and herbs. As far as possible, identification of plant specimens was done in the field itself. Estimation of density of trees was done using quadrate method. The area of one quadrate was fixed as 400 sq m (20 X 20) in which, all the trees above 30 cm girth at breast height (gbh) were enumerated. Within each of these quadrate, two 25 sqm (5m X 5m) quadrates were selected for sampling shrubs and four 1sqm (1X1) quadrates for herbs. In all the sites, transect enumeration was made of the first 100 trees encountered in a belt independently. Point Quarter method was avoided for the smallness of the study area. All the samples were identified up to Recognizable Taxonomic Units (RTU) in the field on the basis of the morphological variation and later identified them to actual species in the laboratory.

Fauna

For mammals, no quantitative study was conducted and only indirect data (information from the local people and elder people in the study area) were collected. For birds and butterflies quadrat sampling was conducted. Based on data generated an exhaustive checklist has been prepared.

Fig. 3- A Zoology student in search of fish in *Lalam thodu*

In the case of fishes, information from the local people was also collected in addition to detailed sampling of fishes from two rivers *Lalam* River and *Aazhiveli thode*. Nets were used in some locations for the collection of fishes. Identification of the organisms especially of birds, butterflies and fishes was done with the help of literature.

Fig. 4 - *Pundias filamentosus*

Fig. 5 - *Etropus maculates* (Pallathi)

Altogether, 20 field trips lasting for a day to two or three days were made. Usually Saturdays and other holidays were selected for the field trips. Assistance of field experts from local people was also adopted for familiarizing the study area and for the collection some of the plant specimens. The team interviewed some of the elder persons to know more about the uses and the availability, early history and other relevant information.

Results

Flora

In this exploration, 562 species of flowering plants were recorded from the study area. Two species of gymnosperms, 553 species angiosperms including 26 species of orchids were identified from this area during the study. A complete checklist of all the plant species identified in this survey is given in Appendix 1. They are of 115 species of trees, 97 species of shrubs, 258 herbs and 91 species of climbers. There were 1898 species of medicinal plants. The medicinal uses of many plants are yet to be record in any scientific literature. Of the 562 species of angiosperms identified in this survey 110 species (i.e., little below 20%) are endemic to the Peninsular India. There are 62 species of grasses, 14 species of orchids and 31 species of legumes recognized by the students in the study area. Presence of trees like *Antiaris toxicaria* (Maravuri), *Gymnacranthera canarica* (Fig. 6) (Undappayin), *Vateria indica* (Thelli), *Holigarna grahamii* (Vellavheru) etc shows the biotic importance of the study area.

Fig. 6 - *Vateria indica* (vellathelli)

In plot sampling study (quadrate method), quadrates of 20m X 20m were laid out for trees, 5m X 5m quadrates for shrubs and 1m X 1m quadrates for herbs. The following densities were observed in the sacred grove.

Table 1. Density of various classes of vegetation in the sacred grove

No.	Size of quadrate	Number of individuals	Density per ha.
1	20m X 20m	17 trees	425 trees
2	5m X 5m	51 shrubs	20,400 shrubs
3	1m X 1m	15 herbs	1,50,000 herbs

With regard to the reparian flora, the first 100 trees were counted since in most of the riverbanks in the study area reparian vegetation formed only a narrow fringe. The results are presented in Table 2.

Table 2. Data on riparian vegetation in the study area

No.	Name of the plant	Number observed
1	*Acacia pennata*	14
2	*Neonuclea corymbosa*	13
3	*Hopea parviflora*	10
4	*Homonoia reparia*	9
5	*Madhuca neriifolia*	7
6	*Macaranga peltata*	6
7	*Antidesma menasu*	4
8	*Ochlandra travancorica*	4
9	*Leea indica*	3
10	*Artocarpus heterophyllus*	3
11	*Hydnocarpus pentamdra*	3
12	*Bridelia retusa*	3
13	*Mallotus phillipensis*	3
14	*Ficus hispida*	2
15	*Ficus exasperata*	2
16	*Xanthophyllum flavescens*	2
17	*Spatholobus purpureus*	2
18	*Strychnos nux-vomica*	2
19	*Artocarpus hirsuta*	2
20	*Holigarna arnottiana*	2
21	*Holigarna grahamii*	1
22	*Holigarna nigra*	1
23	*Pongamia pinnata*	1
24	*Ziziphus rugosa*	1

Fig. 7 - *Holigarna grahamii* (Vellacheru)

Animals: Altogether, six species of mammals, 46 species of birds, 26 species of butterflies, 21 species of fishes Figs. 4 & 5), two of fresh water mussels and one species of fresh water prawn were recorded. Though small in area the sacred grove Pathi was rich with good birds population (Appendix-2). The high number of fishes in the Lalam thodu and the high number of birds in the Sacred Groves shows the significance of these habitats in sustaining biodiversity.

Discussion

The results of this study show that although the land area of Karoor Panchayat had undergone intensive agricultural practices during the past centuries, it still retains a rich biodiversity in terms of wild plants and animals. In fact, the occurrence of a good river system (*Lalam thodu* and *Aazhiveli thodu*) and patches of wild vegetation protected in the Sacred Groves (*Pathi kavu*) have contributed much for the occurrence of such a rich diversity in terms of Birds, Butterflies and Fishes. The fringes of riparian vegetation along Lalam thodu supports a a good number of endemic plants (about 20%). However, the extensive rubber plantations and various construction activities have almost destroyed the diversity of the area.

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Appendix 1- A checklist of plants identified from the study area	
Family/Species	**Remarks**
A N U N C U L A C E A E *Naravelia zeylanica* (Linn.) DC	-
D I L L E N I A C E A E *Dillenia pentagyna* Roxb. *Tetracera akara* (Burm. f.) Merr.	- -
A N N O N A C E A E *Artabotrys zeylanicus* Hook. f. & Thoms *Meiogyne pannosa* (Dalz.) Sinclair *Anona squamosa* Lin. *A. reticulata* Lin.	- - Endemic to Peninsular India -
M E N I S P E R M A C E A E *Anamirta cocculus* (LINN.) Wight & Arn. *Cyclea arnottii* Miers *Cyclea peltata* (Poir.) Hook. f. & Thoms. *Diploclisia glaucescens* (Binn.) Diels *Tinospora sinensis* (Lour.) Merr.	- - Endemic to Peninsular India - -
C A P P A R A C E A E *Cleome rutidosperma* DC. *Cleome viscosa* Lin. *Crateva magna* (Lour.) DC.	- - -
F L A C O U R T I A C E A E *Flacourtia montana* Grah. *Hydnocarpus pentandra* (Buch.-Ham.) Oken	- -
P O L Y G A L A C E A E *Xanthophyllum arnottianum* Wight. **C A R Y O P H Y L L A C E A E** *Polycarpon prostratum* (Forsk.) Asch. & Sehweinf	Endemic to Peninsular India -

P O R T U L A C A C E A E	
Portulaca oleracea Lin.	-
C L U S I A C E A E	
Calophyllum calaba Lin.	-
Garcinia gummi-gutta (Lin.) Robs.	-
D I P T E R O C A R P A C E A E	
Hopea parviflora Bedd.	Endemic to Peninsular India
Vateria indica Lin.	Endemic to Peninsular India
M A L V A C E A E	
Abelmoschus angulosus Lin. *ex Hibiscus hispidissimus* Griff.	-
Hibiscus surattensis Lin.	-
Hibiscus tiliaceus Lin.	-
Sida acuta Burm. f.	-
Sida alnifolia Lin.	-
Sida rhomboidea Roxb. ex Fleming	-
Sida scabrida Wight & Arn.	-
Thespesia lampas (Cav.) Dalz. & Gibs.	-
Urena lobata Lin.	-
Urena sinuata Lin.	-
B O M B A C A C E A E	
Bombax ceiba Lin.	-
S T E R C U L I A C E A E	
Helicteres isora Lin.	-
Melochia corchorifolia Lin.	-
Pterygota alata R. Br.	-
Sterculia guttata Roxb. ex DC	-
Waltheria indica Lin.	-
T I L I A C E A E	
Grewia glabra Lin.	-
Triumfetta rhomboidea Jacq.	-
E L A E O C A R P A C E A E	
Elaeocarpus tuberculatus Roxb.	-

M A L P I G H I A C E A E	
Hiptage benghalensis (Lin.) Kurz.,	-
O X A L I D A C E A E	
Biophytum reinwardtii (Zucc.) Klotzsch	-
Biophytum sensitivum (Lin.) DC.	-
Oxalis corniculata Lin.	-
B A L S A M I N A C E A E	
Impatiens balsamina Lin.	-
Impatiens flaccida Arn.	-
R U T A C E A E	
Acronychia pedunculata (Lin.) Miq.	-
Clausena austroindica Stone & Nair	-
Glycosmis mauritiana (Lam.) Tanaka	-
Melicope lunu-ankenda (Gaertn.) T. Hartley	-
Toddalia asiatica (Lin.) Lam.	-
I C A C I N A C E A E	
Gomphandra tetrandra (Wal.) Sleumer	-
Miquelia dentata Bedd.	-
Sarcostigma kleinii Wight & Arn.	-
C E L A S T R A C E A E	
Celastrus paniculatus Willd.	-
Lophopetalum wightianum Arn..	- Endemic to Peninsular India
R H A M N A C E A E	
Ziziphus oenoplia (Lin.) Millinn.	-
V I T A C E A E	
Cayratia carnosa (Wight & Arn.) Gagnep.	-
Cayratia mollissima Gagnep.	-
Cayratia pedata (Lam.) Juss. *ex* Gagnep. var. *pedata*	-
Cissus discolor Lin.	-
	-

Cissus glyptocarpa (Thw.) Planch. *Cissus repens* Lam.	-
L E E A C E A E *Leea guineensis* G. Don *Leea indica* (Burm. f.) Merr.	- Endemic to Peninsular India
S A P I N D A C E A E *Allophylus cobbe* (Linn.) Raeusch. *Cardiospermum halicacabum* Lin. *Dimocarpus longan* Lour. *Lepisanthes erecta* (Thw.) Leenh. *Schleichera oleosa* (Lour.) Oken	- - - Endemic to Peninsular India Endemic to Peninsular India

A N A C A R D I A C E A E	
Holigarna arnottiana Hook. f.	Endemic to Peninsular India
Holigarna ferruginea Marchand	-
Holigarna grahamii (Wight) Kurz	-
Lannea coromandelica (Houtt.) Merr.	Endemic to Peninsular India
Mangifera indica Lin.	-
Nothopegia racemosa (Dalz.) Ramam.	-
Semecarpus auriculata Bedd.	-
Spondias mangifera Willd.	Endemic to Peninsular India
F A B A C E A E Leguminosae, Papilionaceae	
Subfamily: F A B IN A E	
Abrus pulchellus Wal. *ex* Thw.	-
Aganope thyrsiflora (Benth.) Polhill	-
Alysicarpus vaginalis (Lin.) DC. var. vaginalis Baker	-
Centrosema pubescens Benth.	-
Crotalaria pallida Dryand.	-
Dalbergia latifolia Roxb.	-
Dalbergia sissoides Grah. *ex* Wight & Arn.	-
Derris brevipes (Benth.) Baker	-
Desmodium gangeticum (Lin.) DC.	-
Desmodium heterophyllum (Willd.) DC.	-
Desmodium motorium (Houtt.) Merr.	-
Desmodium triflorum (Lin.) DC.	-
Erythrina stricta Roxb.	-
Glycerridia maculata	-
Millettia rubiginosa Wight & Arn.	-
Mucuna atropurpurea DC.	-
Pongamia glabra Vent.	-
Pterocarpus marsupium Roxb.	-

Spatholobus purpureus Benth. *ex* Baker	
Tephrosia purpurea (Lin.) Pers.	-
	-
Subfamily: C A E S A L P I N I O I D E A E	
Bauhinia phoenicea Wight & Arn.	
Cassia fistula Lin.	-
Cassia occidentalis Lin.	-
Cassia tora Linn.	-
Humboldtia vahliana Wight.	-
	-
Subfamily: M I M O S O I D E A E	
Acacia pennata (Lin.) Willd.	
Albizia chinensis (Osbeck) Merr.	-
Albizia lebbeck (Linn.) Willd.	-
Mimosa diplotricha C. Wight & Sanvalle	-
Mimosa pudica Lin.	-
Xylia xylocarpa (Roxb.) Taub.	-
	-

R H I Z O P H O R A C E A E	
Carallia brachiata (Lour.) Merr.	Endemic to Peninsular India
C O M B R E T A C E A E	
Calycopteris floribunda Lam.	-
Combretum ovalifolium Roxb.	-
Terminalia bellirica (Gaertn.) Roxb.	-
Terminalia elliptica Willd.	-
Terminalia paniculata Roth	-
M Y R T A C E A E	
Syzygium heyneanum (Duthie) Wal. *ex* Gamble	-
Syzygium jambos (Lin.) Alston	-
Psidium guajava Lin.	Endemic to Peninsular India
L E C Y T H I D A C E A E	
Barringtonia acutangula Gaertn	-
Careya arborea Roxb.	-
M E L A S T O M A T A C E A E	
Clidemia hirta D. Don	-
Medinilla beddomei Clarke	-
Melastoma malabaricam Lin.	-
Memecylon edule Roxb.	Endemic to Peninsular India
Memecylon malabaricum (Clarke) Cogn.	-
Osbeckia gracilis Bedd.	Endemic to Peninsular India
Osbeckia virgata D. Don ex Wight et Arn.	Endemic to Peninsular India
Sonerila rheedii Wight & Arn.	
L Y T H R A C E A E	
Lagerstroemia microcarpa Wight	-
Lagerstroemia speciosa (Lin.) Pers.	Endemic to Peninsular India
Rotala indica (Willd.) Koehne	-
Rotala rosea (Poir.) Cook	-
O N A G R A C E A E	
Ludwigia adscendens (Lin.) Hara	-

C U C U R B I T A C E A E	
Diplocyclos palmatus (Lin.) Jeffrey	-
Luffa cylindrica (Lin.) M. Roem.	-
Mukia maderaspatana (Lin.) Roem.	-
Trichosanthes nervifolia Lin.	-
Zehneria maysorensis (Wight & Arn.) Arn.	-

D A T I S C A C E A E	
Tetrameles nudiflora R. Br.	-
B E G O N I A C E A E	
Begonia malabarica Lam.	Endemic to Peninsular India
Begonia trichocarpa Dalz.	Endemic to Peninsular India
M O L L U G I N A C E A E	
Mollugo pentaphylla Lin.	-
A P I A C E A E	
Centella asiatica (Lin.) Urban	-
R U B I A C E A E	
Argostemma courtallense Arn	-
Canthium angustifolium Roxb.	Endemic to Peninsular India
Canthium dicoccum (Gaertn.) Teijsm. & Binn.	-
Canthium parviflorum Lam.	-
Chassalia curviflora (Walker.) Thw.	-
Dentella repens (Lin.) J. R. & G. Forst.	-
Geophila repens (Lin.) Johnst.	-
Haldina cordifolia (Roxb.) Ridsd.	-
Hedyotis auricularia Lin.	-
Hedyotis brachypoda (DC.) Sivar. & Biju.	-
Hedyotis corymbosa (Lin.) Lam.	-
Hedyotis herbacea Lin.	-
Hedyotis nitida Wight & Arn.	-
Hymenodictyon obovatum Walker	Endemic to Peninsular India
Ixora malabarica (Dennst.) Mabber	Endemic to Peninsular India
Knoxia sumatrensis (Retz.) DC.	-
Knoxia wightiana Walker ex Wight & Arn.	-
Mitracarpus villosus (Sw.) DC.	-
Mitragyna parvifolia (Roxb.) Korth.	-

Morinda umbellata Lin.	-
Mussaenda belilla Buch.-Ham.	-
Neolamarckia cadamba (Roxb.) Bosser	-
Neonauclea purpurea (Roxb.) Merr.	Endemic to Peninsular India
Ophiorrhiza mungos Lin.	-
Ophiorrhiza pectinata Arn.	-
Pavetta hispidula Wight & Arn.	Endemic to Peninsular India
Richardia scabra Lin.	-
Spermacoce articularis Lin. f.	-
Spermacoce latifolia Aublet	-
Spermacoce mauritiana Osea Gideon ex Verdc.	-

A S T E R A C E A E	
Acanthospermum hispidum DC.	-
Adenostemma lavenia (Lin.) O. Ktze	-
Ageratum conyzoides Lin.	-
Blumea eriantha DC.	-
Blumea hieracifolia (D. Don) DC.	-
Blumea lacera (Burm. f.) DC.	Southern Western Ghats. Rare
Blumea oxyodonta DC.	-
Centipeda minima (Lin.) A. Braun & Asch.	-
Chromolaena odorata (Lin.) King & Robins.	-
Eclipta prostrata (Lin.)	-
Elephantopus scaber Lin.	-
Eleutheranthera ruderalis (Sw.) Sch.-Bip.	-
Emilia sonchifolia (Lin.) DC.	-
Mikania cordata (Burm. f.) Robinson	-
Parthenium hysterophorus Lin.	-
Phyllocephalum phyllolaenum (DC.) Narayana	-
Sphaeranthus indicus Lin.	-
Spilanthes radicans Jacq.	-
Synedrella nodiflora (Linn.) Gaertn.	-
Tridax procumbens Lin.	-
Vernonia cinerea (Lin.) Less.	-
Vicoa indica (Lin.) DC.	-
Wedelia calandulacea Less.	-
M Y R S I N A C E A E	
Embelia ribes Burm. f.	-
Maesa indica (Roxb.) DC.	-
S A P O T A C E A E	
Madhuca neriifolia (Moon) H. J. Lam	-

S Y M P L O C A C E A E	
Symplocos cochinchinensis (Lour.) Moore	-
O L E A C E A E	
Chionanthus mala-elengi (Dennst.) P.S.Green	-
Jasminum rottlerianum Walker. *ex* DC.	-
Myxopyrum smilacifolium Lin.	-
Olea dioica Roxb.	Peninsular India.
A P O C Y N A C E A E	
Aganosma cymosa (Roxb.) G. Don	-
Alstonia scholaris (Lin.) R. Br.	-
Alstonia venenata R. Br.	-
Anodendron rhinosporum Thw.	-
Chilocarpus denudatus Lin.	Endemic to Kerala and Karnataka.
Chonemorpha grandiflora (Roth) M. R. & S. M. Almeida	-
Holarrhena pubescens (Buch.-Ham.) Lin. *ex* G. Don	-
Ichnocarpus frutescens (Lin.) R. Br	Endemic to Southern Western Ghats.
Rauvolfia micrantha Hook. f.	-
Rauvolfia serpentina (Lin.) Benth. *ex* Kurz	Endemic to Southern Western Ghats.
Tabernaemontana gamblei Subram. & Henry	Endemic to Western Ghats.
Tabernaemontana heyneana Walker.	-
Wrightia arborea (Dennst.) Mabber.	-
Wrightia tinctoria (Roxb.) R. Br.	
A S C L E P I A D A C E A E	
Asclepias curassavica Lin.	-
Calotropis gigantea (Lin.) R. Br.	-
Cosmostigma racemosum (Roxb.) Wight	-
Cryptolepis buchananii Roem. & Schult.	-
Gymnema sylvestre (Retz.) R. Br. ex Schult.	-

Hemidesmus indicus (Lin.) R. Br.	-
Hoya pauciflora Wight	-
L O G A N I A C E A E	
Fagraea ceylanica Thunb.	-
Strychnos lenticellata Lin.	-
Strychnos minor Dennst.	Southern Western Ghats, endemic.
Strychnos nux-vomica Lin.	-
G E N T I A N A C E A E	
Canscora diffusa (Vahl) R. Br. *ex* Roem. & Schultes	-
Canscora roxburghii Arn. *ex* Miq.	-
B O R A G I N A C E A E	
Coldenia procumbens Lin.	-
Ehretia indica (Dennst. *ex* KosteL) M.R. & S.M. Almeida	-
Heliotropium indicum Lin.	-
Rotula aquatica Lour.	-
C O N V O L V U L A C E A E	
Argyreia hirsuta Wight & Arn.	-
Cuscuta chinensis Lam.	-
Erycibe paniculata Roxb.	-
Hewittia malabarica (Lin.) Suresh	-
Ipomoea cairica (Lin.) Sweet	-
Ipomoea deccana Austin	-
Ipomoea nil (Linn.) Roth.	-
Ipomoea obscura (Linn.) Ker.-Gawl.	-
Ipomoea pestigridis Lin.	-
Merremia hederacea (Burm. f.) Hall. f.	-
Merremia tridentata (Lin.) Hall. f.	-
Merremia vitifolia (Burm. f.) Hall. f.	-
Merremia umbellata (Lin.) Hall. f.	

S O L A N A C E A E	
Datura metel Lin.	-
Physalis minima Lin.	-
Solanum americanum Mill.	-
S. anguivi Lam. var. *multiflora* (Roth ex Roem. & Schultes) - Peninsular India.	-
Solanum capsicoides All.	-
Solanum melongena Lin.	-
Solanum torvum Sw.	-
S C R O P H U L A R I A C E A E	
Adenosma subrepens Benth.	-
Artanema longifolia (Linn.) Vatke	-
Dopatrium junceum (Roxb.) Buch.-Ham. *ex* Benth.	-
Limnophila aromatica (Lam.) Merr.	-
Limnophila indica (Lin.) Druce	-
Limnophila repens (Benth.) Benth.	-
L .dernia anagallis (Burm. f.) Pennell	-
L. dernia ciliata (Colsm.) Pennell	-
L. dernia crustacea (Linn.) F. Muell.	-
Mecardonia procumbens (Mill.) Small	-
Scoparia dulcis Lin.	-
Striga asiatica (Linn.) O. Ktze.	-
Torenia bicolor Dalz -	-
O R O B A N C H A C E A E	
Aeginetia indica Lin.	South India
L E N T I B U L A R I A C E A E	
Utricularia scandens Benj.	-
G E S N E R I A C E A E	
Aeschynanthus perrottetii A. DC	

B I G N O N I A C E A E	-
Pajanelia longifolia (Willd.) K. Schum.	-
Tecoma stans (Lin.) Kunth	Peninsular India; endemic.
P E D A L I A C E A E	
Sesamum orientale Lin.	
A C A N T H A C E A E	
Andrographis atropurpurea (Dennst.) Alston	-
Andrographis paniculata (Burm. f.) Walker *ex* Nees	-
Asystasia dalzelliana Sant.	-
Asystasia gangetica (Lin.) T. Anders.	-
Dipteracanthus prostratus (Poir.) Nees -	Peninsular India.
Eranthemum capense Lin.	S. Western India. Rare
Gymnostachyum febrifugum Benth.	-
Hygrophila salicifolia (Vahl) Nees	-
Justicia betonica Lin.	Endemic to Peninsular India.
Justicia gendarussa Burm. f.	Southern Western Ghats.
Justicia procumbens Lin.	S. W. India.
Justicia santapaui Bennet	-
Pseuderanthemum malabaricum (Clarke) Gamble	-
Rungia pectinata (Lin.) Nees	-
Staurogyne zeylanica (Nees) Ktze.	Southern Western Ghats.
Strobilanthes ciliatus Nees	-
Strobilanthes tristis (Wight) T. Anders.	Southern Western Ghats; endemic.
Thunbergia fragrans Roxb.	Southern Western Ghats.
V E R B E N A C E A E	
Callicarpa tomentosa (Lin.) Murr.	
Clerodendrum paniculatum Lin.	
Clerodendrum serratum (Lin.) Moon	

Clerodendrum viscosum Vent.	
Gmelina arborea Roxb.	Peninsular India.
Lantana camara Linn.	-
Premna coriacea Clarke	-
Stachytarpheta jamaicensis (Linn.) Vahl	-
Tectona grandis Lin. f.	-
Vitex altissima Lin f.	-
Vitex leucoxylon Lin. f.	-
L A M I A C E A E	
Acrocephalus hispidus (Linn.) Nicols. & Sivadas.	South India.
Anisochilus carnosus (Linn. f.) Wallin. *ex* Benth.	-
Coleus malabaricus Benth.	-
Hyptis capitata Jacq.	-
Hyptis suaveolens (Lin.) Poit.	-
Leucas biflora (Vahl) R. Br.	-
Leucas indica (Lin.) R. Br. ex Vatke	-
Ocimum americanum Lin.	-
Ocimum gratissimum Lin.	-
Orthosiphon thymiflorus (Roth) Sleensen	-
Pogostemon paniculatus (Willd.) Benth.	-
Pogostemon purpurascens Dalz.	-
N Y C T A G I N A C E A E	
Boerhavia diffusa Lin.	-
A M A R A N T H A C E A E	
Achyranthes aspera Lin. var. *aspera*	-
Allmania nodiflora (Lin.) R. Br. *ex* Wight	Western Peninsular India.
Alternanthera sessilis (Lin.) R. Br. *ex.* DC.	Western Peninsular India.
Amaranthus viridis Lin.	-
	-
	-

Cyathula prostrata (Lin.) Benth.	
Gomphrena serrata Lin.	
P O L Y G O N A C E A E	-
Polygonum chinense Lin.	-
Polygonum hydropiper Lin.	
P O D O S T E M A C E A E	-
Indotristicha ramosissima (Wight) van Royen	-
Polypleurum stylosum (Wight)	-
Zeylanidium lichenoides (Kurz) Engl.	
A R I S T O L O C H I A C E A E	-
Aristolochia indica Lin.	
Aristolochia tagala Cham.	-
Thottea siliquosa (Lam.) Ding Hou.	-
P I P E R A C E A E	Southern Western Ghats.
Piper nigrum Lin.	
C H L O R A N T H A C E A E	Southern Western Ghats.
Sarcandra chloranthoides Gard.	
E L A E A G N A C E A E	
Elaeagnus comferta Roxb.	-
M Y R I S T I C A C E A E	
Gymnacranthera farquhariana (Hook. f. & Thoms.) Warb.	-
Knema attenuata (Hook. f. & Thoms.) Warb.	Peninsular India
L A U R A C E A E	
Cinnamomum macrocarpum Hook. f.	-
Cinnamomum malabatrum (Burm. f.) Bl.	-
Cinnamomum verum J. Preslin.	-
Cryptocarya bourdillonii Gamble	-
Litsea coriacea (Heyne *ex* Meisner) Hook. f.	-
Litsea glabrata (WalLinn. ex Nees) Hook. f.	-

Litsea insignis Gamble	-
Litsea laevigata (Nees) Gamble	-
Litsea ligustrina (Nees) Hook. f.	Southern Western Ghats.
Persea macrantha (Nees) Kosterm.	-
L O R A N T H A C E A E	
Dendrophthoe falcata (Lin. f.) Etting.	Western Peninsular India.
Helicanthes elasticus (Desr.) Danser	Western Ghats.
Helixanthera intermedia (Wight) Danser	Peninsular India.
E U P H O R B I A C E A E	Western Ghats.
Acalypha racemosa Heyne *ex* Baill.	-
Actephila excelsa (Dalz.) Muell.-Arg.	Western Peninsular India.
Agrostistachys indica Dalz.	Peninsular India.
Antidesma acidum Retz.	India.
Antidesma menasu (Tulin.) Miq. *ex* Muellin-Arg.	-
Aporusa Lindleyana (Wight) Baill.	Peninsular India.
Blachia umbellata (Willd.) Bail.	-
Breynia vitis-idaea (Burm. f.) Fischer	-
Bridelia airy-shawii Lin.	Peninsular India.
Bridelia scandens (Roxb.) Willd.	South Western India. Rare
Croton bonplandianus Bail.	-
Croton tiglium Linn.	-
Croton zeylanicus Muel.-Arg.	-
Drypetes venusta (Wight) Pax & Hoffm.	-
Epiprinus mallotiformis (Muel.-Arg.) Croizat	-
Euphorbia hirta Lin.	Peninsular India.
Euphorbia thymifolia Lin.	-
Excoecaria crenulata Wight	Peninsular India.
Glochidion zeylanicum (Gaertn.) Juss.	-
Homonoia riparia Lour.	-
	-
	-

Macaranga indica Wight	
Mallotus philippensis (Lam.) Muel.-Arg.	Peninsular India.
Phyllanthus amarus Schum. & Thonn.	-
Phyllanthus reticulatus Poir.	-
Phyllanthus urinaria Lin.	-
Ricinus communis Lin.	Peninsular India.
Sauropus androgynus (Lin.) Merr.	Peninsular India.
Sebastiania chamaelea (Lin.) Muel.-Arg.	-
Securinega virosa (Roxb. ex Willd.) Bail.	-
Suregada angustifolia (Bail. *ex* Muel.-Arg.) Airy Shaw	-
Tragia bicolor Miq.	-
Trewia nudiflora Lin.	
U R T I C A C E A E	-
Boehmeria glomerulifera Miq.	-
Elatostema eolatum Wight	-
Elatostema eolatum Wight	-
Laportea interrupta (Lin.) Chew	-
Pellionia heyneana Wedd.	-
Pilea melastomoides (Poir.) Bl.	-
Pouzolzia auriculata Wight	-
Pouzolzia zeylanica (Lin.) Benn.	-
Celtis tetrandra Roxb.	-
Trema orientalis (Lin.) Bl.	
M O R A C E A E	
Antiaris toxicaria Lesch.	Southern Western Ghats; endemic.
Artocarpus heterophyllus Lam.	Peninsular India.
Artocarpus hirsutus Lam.	
Dorstenia indica Walker. *ex* Wight	-
Ficus amplocarpa Govindarajalu &	-

Masilamoney	-
Ficus callosa Willd.	-
Ficus exasperata Vahl	-
Ficus hispida Lin. f.	-
Ficus microcarpa Lin. f.	-
Ficus racemosa Lin.	-
Ficus rigida Jack	-
Ficus tinctoria Forst. f.	-
Ficus tsjahela Burm. f.	
H Y D R O C H A R I T A C E A E	-
Blyxa aubertii Rich.	
O R C H I D A C E A E	-
Acampe ochracea Hochr.	-
Bulbophyllum mysorense (Rolfe) J.J. Sm.	Peninsular India.
Bulbophyllum neilgherrense Wight	-
Cheirostylis flabellata (Wight) Hook. f.	-
Cymbidium aloifolium (Lin.) Sw.	-
Dendrobium macrostachyum Lin.	
Kingidium niveum Sathish,	-
Luisia zeylanica Lin.	-
Oberonia recurva Lin.	-
Pholidota pallida Lin.	-
Podochilus malabaricus Wight	-
Rhynchostylis retusa (Lin.) BLinn.	-
Sirhookera lanceolata (Wight) O. Ktze.	-
Vanda testacea (Linn. dL.) Reichb. f.	
Z I N G I B E R A C E A E	-
Alpinia galanga (Lin.) Sw.	-
Alpinia nigra (Gaertn.) Burtt	Southern Western Ghats.
Amomum pterocarpum Thw.	-
	-

Costus speciosus (Koenig) Smith	-
Hedychium coronarium Koenig	Southern Western Ghats. Rare
Zingiber officinale Rosc.	
Zingiber zerumbet (Lin.) Smith	-
M U S A C E A E	-
Musa paradissiaca	
Musa sapiandum	South West India.
H A E M O D O R A C E A E	South India. Rare
Peliosanthes teta Andr. sub sp. humilis	
(Andr.) Jessop	
A M A R Y L L I D A C E A E	-
Pancratium triflorum Roxb.	-
A G A V A C E A E	
Dracaena terniflora Roxb.	-
H Y P O X I D A C E A E	-
Curculigo orchioides Gaertn.	
Hypoxis aurea Lour.	-
D I O S C O R E A C E A E	-
Dioscorea bulbifera Lin.	-
Dioscorea oppositifolia Lin.	
Dioscorea tomentosa Koen. *ex* Spreng.	-
L I L I A C E A E	-
Asparagus racemosus Willd.	-
Chlorophytum laxum R. Br.	
Gloriosa superba Lin.	-
L I L A C A C E A E	
Smilax zeylanica Lin.	-
P O N T E D E R I A C E A E	
Monochoria vaginalis (Burm. f.) Presl.	-
C O M M E L I N A C E A E	-
Commelinna benghalensis Lin.	-

Commelina diffusa Burm. f.	-
Commelina ensifolia R. Br.	-
Cyanotis cristata (Lin.) D. Don	-
Dictyospermum montanum Wight.	-
Dictyospermum protensum Wight	-
Murdannia dimorpha (Dalz.) Brueck.	-
Murdannia simplex (Vahl) Brenan	
Tonningia axillaris (Linn.) O. Ktze.	-
A R E C A C E A E	-
Calamus thwaitesii Becc. & Hook. f.	-
Caryota urens Lin.	
Corypha umbraculifera Lin.	-
P A N D A N A C E A E	-
Pandanus thwaitesii Mart.	
P. tectorius Sol.	-
A R A C E A E	-
Alocasia fornicata (Roxb.) Schott	-
Alocasia macrorrhizos (Linn.) G. Don	-
Amorphophallus paeoniifolius (Dennst.)	-
Nicols, var. paeoniifolius Sivadas.	-
Colocasia esculenta (Lin.) Schott	-
Cryptocoryne retrospiralis (Roxb.) Kunth	-
Lagenandra meeboldii (Englin) Fischer	-
Lagenandra ovata (Lin.) Thw.	-
Pothos scandens Lin.	-
Raphidophora pertusa (Roxb.) Schott	
Theriophonum infaustum N. E. Br	-
N A J A D A C E A E	
Najas indica (Willd.) Cham.	-
E R I O C A U L A C E A E	-
Eriocaulon conica (Fyson) Fischer-	Southern Western Ghats.

Eriocaulon nepalense Prescott ex Bong.	Peninsular India.
Eriocaulon pectinatum Ruhl.	
Eriocaulon xeranthemum Mart.	-
C Y P E R A C E A E	Western Ghats, endemic.
Bulbostylis barbata (Rottb.) Kunth *ex* Clarke	
Bulbostylis densa (Walker. ex Roxb.) Hand. Mazz.	-
	-
Cyperus compressus Lin.	-
Cyperus cuspidatus Kunth	-
Cyperus digitatus Roxb.	Southern Western Ghats.
Cyperus distans Lin. f.	-
Cyperus haspan Lin.	-
Cyperus iria Lin.	-
Cyperus pilosus Vahl	-
Cyperus procerus Rottb	-
Cyperus rotundus Lin.	-
Fimbristylis aestivalis (Retz.) Vahl	-
Fimbristylis aphylla Steud.	-
Fimbristylis bisumbellata (Forssk.) Bubani	-
Fimbristylis cinnamometorum (Vahl) Kunth	South India, Endemic.
Fimbristylis glabra Steud.	-
Fimbristylis littoralis Gaud.	-
Hypolytrum nemorum (Vahl) Spreng.	-
Kylga brevifolia Rottb.	South India.
Kylga bulbosa Beauv.	-
Lipocarpha chinensis (Osbeck) Kern.	-
Mariscus dubius (Rottb.) Kukenth. *ex* Fischer	-
Mariscus squarrosus (Lin.) Clarke	-
Pycreus unioloides (R. Br.) Makino	-
Rhynchospora corymbosa (Linn.) Brit.	Endemic to Southern Western Ghats. Rare

Schoenoplectus juncoides (Roxb.) Palla	-
P O A C E A E	Endemic to Southern Western Ghats.
Alloteropsis cimicina (Lin.) Stapf	-
Arthraxon lancifolius (Trim.) Hochst.	Endemic to Southern Western Ghats. Rare
Arthraxon meeboldii Stapf.	-
Arundinella mesophylla Nees ex Steud.	Endemic to Southern Western Ghats.
Arundinella pumila (Hochst. ex A. Rich.) Steud.	-
Axonopus compressus (Sw.) P. Beauv.	-
Bambusa bambos (Lin.) Voss	-
Bothriochloa insculpta (Hochst. ex A. Rich.) A. Camus	-
Brachiaria brizantha (Hochst. ex A. Rich.) Stapf.	-
Brachiaria ramosa (Lin.) Stapf.	-
Centotheca lappacea (Lin.) Desv.	-
Chionachne koenigii (Spreng.) Thw.	-
Chloris barbata Sw.	-
Chrysopogon aciculatus (Retz.) Trin.	-
Coix lacryma-jobi Lin.	-
Cymbopogon flexuosus (Nees ex Steud.) Wats.	-
Cynodon dactylon (Lin.) Pers.	-
Cyrtococcum muricatum (Retz.) Bor.	-
Cyrtococcum patens (Linn.) A. Camus	-
Dactyloctenium aegyptium (Lin.) P. Beauv.	-
Digitaria ciliaris (Retz.) Koeler, Descr.	-
Digitaria longiflora (Retz.) Pers.	-
Digitaria setigera Roth. ex Roem. & Schult.	Endemic to South India.
Dimeria ornithopoda Trim.	-

Echinochloa colona (Lin.)	-
Echinochloa crusgalli (Lin.) P. Beauv.	-
Echinochloa stagnina (Retz.) P. Beauv.	-
Eleusine indica (Lin.) Gaertn.	-
Eragrostis unioloides (Retz.) Nees *ex* Steud.	-
Eragrostis viscosa (Retz.) Trin.	Peninsular India. Very rare
Garnotia tenella (Arn. ex Miq.) Janowski	Peninsular India
Heteropogon contortus (Lin.) P. Beauv. ex Roem. & Schult.	-
Ischaemum indicum (Houtt.) Merr.	-
Ischaemum mangaluricum (Hack.) Stapf. *ex* Fischer	-
	-
Ischaemum zeylanicolum (Hack.) Bor	-
Lophatherum gracilis Brogn.	-
Microstegium ciliatum (Trin.) A. Camus	-
Ochlandra travancorica Benth. *ex* Gamble -	-
Oplismenus compositus (Lin.) P. Beauv.	-
Ottochloa nodosa (Kunth) Dandy	-
Panicum notatum Retz.	-
Paspalidium flavidum (Retz.) A. Camus	-
Paspalum conjugatum Berg.	-
Paspalum distichum Lin.	-
Paspalum scrobiculatum Lin.	-
Pennisetum polystachyon (Lin.) Schult.	-
Perotis indica (Lin.) O. Ktze.	-
Pogonatherum crinitum (Thunb.) Kunth	
Pseudanthistiria umbellata (Hack.) Hook. f.	-
Pseudoxytenanthera monadelpha (Thw.) Sodestrom & Ellis	-
	-
Rhynchelytrum repens (Willd.) C.E. Hubb.	-
Saccharum spontaneum Lin.	-

Sacciolepis indica (Lin.) A. Chase	-
Sacciolepis interrupta (Willd.) Stapf.	
Sacciolepis myosuroides (R. Br.) A. Camus	-
Schizachyrium brevifolium (Sw.) Nees ex	-
Buese	-
Setaria pumila (Poir.) Roem. & Schult.	-
Setaria verticillata (Lin.) P. Beauv.	
Spodiopogon rhizophorus (Steud.) Pilger	-
Sporobolus indicus (Lin.) R. Br var. diander	-
(Retz.) Jovet & Guedes	
Themeda cymbaria (Roxb.) Hack.	
Themeda triandra Forssk.	-
GYMNOSPERMS	
C Y C A D A C E A E	Southern Western Ghats (Kerala).
Cycas circinalis Lin.	
G N E T A C E A E	
Gnetum ula Brongn.	

Appendix 2. A checklist of animals recorded in the survey

BIRDS

Crow Phaesant *Centropus sinensis*

Indian Koel *Eudynamis scolopacea*

Pond Heron Paddybird *Ardeola grayii*

Cattle Egret *Bubulcus ibis*

Little Egret *Egretta garzetta*

Common Crow-Pheasant *Centropus sinensis*

Indian Koel *Eudymamys scolopacea*

Indian House Crow *Corvus splendus*

Indian Tree Pie *Dendrocitta vagabunda*

Whitebellied Tree Pie *Dendrocitta leucogastra*

Southern Large Racket-tailed Drongo *Dicrurus paradiseus*

South Indian Black Drongo *Dicrurus adsimilis*

Jungle Babbler *Turdoides striatus*

Indian House Sparrow *Passer domesticus*

Black-and-Orange Flycatcher *Muscicapa nigrorufa*

Peninsular Indian Paradise Flycatcher *Terpsiphone paradisi*

Black Drongo *Dicrurus adsimilis*

Indian Spotted Dove *Streptopelia chinensis*

Blackwinged Kite *Elanus Caeruleus*

Indian Myna *Acridotheres tristis*

Indian Whitebreasted Kingfisher *Alcedo atthis*

Grey Wagtail *Montacilla cinerea*

Indian Cuckoo *Cuculus micropterus*

Indian Plaintive Cuckoo *Cacomantis passerinus*

Crimson Breasted Barbet *Megalaima haemacephala*

Small Green Barbet *Megalaima viridis*

Spotted owlet *Althene brama*

Night Heron *Nycticorax nycticorax*

Shikra, *Accipiter badius*

Paddyfield Pipit *Anthus novaeseelandiae*

Small Green Barbet *Megalaima viridis*

Large Green Barbet *Megalaima zeylanica*

Roseringed Parakeet *Psittacula krameri*

Blackwinged Kite *Elanus caeruleus*

Jungle Bush Quail *Perdicula argoondah*

Mottled Wood Owl *Strix oscillata*

Redvented Bulbul *Pycnonotus cafer*

Kerala Golden Backed Woodpecker *Dinopium benghaqlense*

Indian Pitta *Pitta benghalensis*

Blackheaded Cuckoo-Shrike *Coracina melanoptera*

Large Pied Wagtail *Motacilla madera*

Rufous Woodpecker *Micropternus brachyurus*

Malabar Whistling Thrush *Myiophonus horsfieldii*

Peninsular Spotted Babbler *Pellorneum ruficeps*

Nilgiri Plain Wren Warbler *Prinia inornata*

Indian Robin *Saxicoloides fulicata*

BUTTERFLIES

Gram blue *Euchrysops cnejus*

Red pierrot *Talicada nyseus*

Common cerulean *Jamides celeno*

Pale grass blue *Psuedozizeeria maha*

Common hedge blue *Actolepis puspa*

Plain tiger *Danaus chrysippus*

Yellow pansy *Junonia hierta*

Lemon pansy *Junonia lemonias*

Danaid eggfly *Hypolimnas misippus*

Common Indian crow *Euploea core*

Blue tiger *Tirumala limniace*

Common fourring *Ypthima huebneri*

Common evening brown *Melanitis leda*

Common bushbrown *Mycalesis perseus*

White or Ceylon fourring *Ypthima ceylonica*

Common fivering *Ypthima baldus*

Common leopard *Phalanta phalantha*

Common sailor *Neptis hylas*

Tamil yeoman *Cirrochroa thais*

Southern birdwing *Troides minos*

Common bluebottle *Graphium sarpedon*

Paris peacock *Papilio paris*

Blue mormon *Papilio polymnestor*

Common mormon *Papilio polytes*

Red helen *Papilio helenus*

Common grass yellow *Eurema hecabe*

Spotless grass yellow *Eurema laeta*

White orange tip *Ixias marianne*

Indian cabbage white *Pieris canidia*

MAMMALS

Jungle Cat *Felis chaus*

Brown Mongoose *Herpestes brachyurus*

Palm Civet *Paradodurus hermaphroditus*

Blacknaped Hare *Lepus nigricollis*

Dusky striped Squirrel *Funambulus subL.eatus*

Layard's striped Sqirrel *Funambulus layardi*

FISHES

Anabas testadeneus (Kalladi)

Aplochilus L.eatus (Manathukanni)

Macropodus cupanus (Karinkana)

Channa Micropeltis

Channa leucopunctatus (Pulivaaha)

Channa Orientalis (Vaton)

Channa striatus (Varal)

Mystus cavasius (Chillankoori)

Ompok bimaculatus (Thulappan)

Clarius dussumeri (Muzhi)

Puntias amphibious (Urulan paral)

Puntias fasciatus (Vazhakkavarayan)

Puntias filamentosus (Chovaliparal)

*Puntiasjerdoni*i (Kaippa)

Puntias sarana subnasutus (Kuruvaparal)

Puntias ticto (Pattar paral)

Etropus maculates (Pallathi)

Chela dadybujori (Chela)

Garra mullya (Kallemutti)

Mastacembulus armatus (Aarakan)

Lepidocephalus thermalis (Manal arakan)

Fresh water Mussels

Lamellidens marginatus (Kakka)

Pila globosa (Njavanikka)

Fresh water prawn

Macrobrachium rosenberghiiI (Konchu)

2.5. Biodiversity of Pramadom Grama Panchayath (Pathanamthitta District)

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Introduction

This study was carried out in Ward l of Pramadom Grama Panchayat, located south west of Pathanamthitta Municipality (Fig. 1). This area which is moderately hilly, is situated at an altitude of 530-540m asl, offer different topographical features such as hills, hilltops, plains, paddy fields and rock formations. The river Achencovil which flows through the margin of the Panchayat for about 12 km, form the main water source of the area. The vegetation is of mixed type including plantations of rubber, arecanut and coconut as well as farm lands. Large areas of Mango and Cashew are also present. The differences in geographical features together with the diverse vegetation offer a rich biodiversity.

Methodology

Plant and animal diversity were studied. Among plants, the angiosperms were covered in detail. Quadrat sampling method was used. A list of sampling plots selected for the study is given in Table 1. Within an area, five sample plots were selected of which, four were corner quadrates and one central. The size of the quadrats used for various plant categories were the following: trees – 10m x10m quadrats, shrubs- 5m x 5m quadrats and herbs – 1m x 1 m quadrats. From each area, five quadrats were analyzed. The number of plants including herbs, shrubs and trees were identified and listed. With regard to fauna, insects particularly beetles and butterflies; spiders, amphibians and reptiles present in the quadrats were recorded. For insects and spiders 5m x 5m and for amphibians and reptiles 10m x 10m quadrats were used. In order to estimate the avian fauna, observations were made along a 200m line transect. From the data generated, frequency, density, diversity and abundance of various groupd were calculated.

Fig.1. Map of Pramadom grama panchayat showing the study area

Results:

Flora

Observations were made in a rubber plantation and in a rocky area at Kulappara. Information generated from various vegetation types are presented below.

1. Rubber plantation

Data generated on plant and animal diversity of rubber plantations is given in Tables 1-8. The frequency, density and abundance of plants are given in Tables 5-7. Of the 43 species of plants recorded in this study, nine were represented as trees, 18 species as medicinal plants, 18 species as shrubs and 16 species as herbs. Being a rubber plantation, in all the sampling areas, the dominant tree species was rubber (*Hevea braziliensis*) followed by *Artocarpus hirsuta* and *Areca catechu*. Among shrubs, *Clerodendrum infortunatum* was very common (57 Nos.) followed by *Ichinocarpus fruticens* (18 Nos.) and Eupatorium odoratum (7 Nos.). Among the herbs, *Piper longum* had maximum representation (96 Nos.) (Tables 1 - 3).

Table 1: List of collected plants

Sl.No.	**Tree species**	**Family**
1	*Cocos nucifera*	Arecaceae
2	*Areca catechu*	Arecaceae
3	*Mangifera indica*	Anacardiaceae
4	*Hevea braziliensis*	Euphorbiaceae
5	*Artocarpus hirsute*	Moraceae
6	*Artocarpus heterophylla*	Moraceae
7	*Thespesia populnea*	Malvaceae
8	*Swietenia mahagoni*	Meliaceae
9	*Tectona grandis*	Verbenaceae
	Shrubs and climbers	
10	*Ichnocarpus frutescens*	Apocynaceae
11	*Chromolaena odoratum*	Asteraceae
12	*Mikania scaandens*	Asteraceae
13	*Cycas circinalis*	Cycadaceae
14	*Macaranga indica*	Euphorbiaceae

15	*Mallotus philippiensis*	Euphorbiaceae
16	*Hibiscus furcatus*	Malvaceae
17	*Ficus asperima*	Moraceae
18	*Vitis cordifolia*	Lauraceae
19	*Vitis pallida*	Lauraceae
20	*Cinnamomum zeylanicum*	Arecaceae
21	*Caryota urens*	Arecaceae
22	*Clerodendron infortunatun*	Verbenaceae
23	*Canthium didymium*	Rubiaceae
24	*Zizyphus oenoplia*	Rhamnaceae
25	*Glycosmis pentaphylla*	Rutaceae
26	*Piper nigrum*	Piperaceae
27	*Myxopyrum serrulatum*	Oleaceae
	Herbs	
28	*Curculigo orchioides*	Amaryllidaceae
29	*Cyathula prostrate*	Amaranthaceae
30	*Rungia repens*	Acanthaceae
31	*Strobilanthes species*	Acanthaceae
32	*Hemidesmus indicus.*	Asclepiadaceae
33	*Elephantopus scaber*	Asteraceae
34	*Cyanotis papilionacea*	Commelinaceae
35	*Cyperus rotundus*	Cyperaceae
36	*Biophytum sensitivum*	Geraniaceae
37	*Gloriosa superba*	Liliaceae
38	*Anisomeles malabarica*	Lamiaceae
39	*Leucas aspera*	Lamiaceae
40	*Vigna wightii*	Papilionaceae
41	*Abrus precatorius*	Papilionaceae
42	*Piper longum*	Piperaceae
43	*Borreria stricta*	Rubiaceae

Table 2: List of Tree species

Sl.No.	Name of plants	Quadrats				
		1	**2**	**3**	**4**	**5**
	Tree species					
1	*Hevea braziliensis*	8	9	5	6	5
2	*Cocos nucifera*	1	-	-	-	-
3	*Areca catechu*	1	9	-	-	-
4	*Tectona grandis*	-	4	5	-	-
5	*Artocarpus hirsuta*	-	6	4	2	-
6	*Artocarpus heterophylla*	-	-	1	-	-
7	*Thespesia populnea*	-	-	-	1	-
8	*Mangifera indica*	-	-	-	1	-
9	*Swietenia mahagoni*	-	-	-	1	-

Table 3: List of shrubs and climbers present in the Rubber plantation

No.	Name of the plants	Quadrats				
	Shrubs and Climbers	1	2	3	4	5
1	*Ichnocarpus frutescens*	11	4	3	-	-
2	*Vitis cordifolia*	3	1	1	1	-
3	*Hibiscus furcatus*	2	1	-	-	1
4	*Clerodendrum infortunatum*	4	15	11	22	5
5	*Caryota urens*	2	2	1	-	-
6	*Macaranga indica*	-	2	-	-	1
7	*Cycas circinalis*	1	-	-	-	-
8	*Cinnamomum zeylanicum*	1	-	-	-	-
9	*Ficus asperima*	-	1	-	-	-
10	*Mallots philippiensis*	2	1	-	-	-
11	*Eupatorium odoratum*	-	1	2	2	1
12	*Mikania scandeus*	-	-	1	-	-
13	*Canthium didymum*	8	-	-	-	3
14	*Vitis pallida*	1	-	-	-	1
15	*Zizyphus oenoplia*	1	-	-	-	1
16	*Glycosmis pentaphylla*	-	-	6	-	2
17	*Piper nigrum*	-	-	1	-	1
18	*Myxopyrum serrulatum*	1	-	-	-	-

Table 4. List of herbaceous plants present in various quadrats in the Rubber plantation

No	Name of the plant	Quadrats					Frequency	Frequency class	Density	Abundance
		1	2	3	4	5				
1.	*Ichnocarpus frutescens*	1	4	3	-		60	C	3.6	6
2.	*Viis cordifolia*	3	1	1	-		80	D	1.2	1.5
3.	*Hibiscus furcatus*	2	1	-	-	1	60	C	0.8	1.3
4.	*Clerodendron infortunatum*	4	5	1	-	25	100	E	11.4	11.4
5.	*Caryota urens*	2	2	1	-		60	C	1	1.6
6.	*Macranga indica*	-	2	-	-	1	40	B	0.6	1.5
7.	*Cycas circinalis*	1	0	-	-		20	A	0.2	1
8.	*Cinnamomum zeylanicum*	1	-	-	-		20	A	0.2	1
9.	*Ficus asperima*	-	1	-	-		20	A	0.2	1
10.	*Mallutus philippiensis*	2	1	-	-		40	B	0.6	1.5
11.	*Eupatorium odoratum*	-	1	2	1		80	D	1.2	1.5
12.	*Mikania scandeus*	-	-	1	-		20	A	0.2	1
13.	*Canthium didymum*	8	-	-	3		40	B	0.2	5.5
14.	*Vitis pallida*	1	-	-	-	1	40	B	0.4	1
15.	*Zizyphus oenoplia*	1	-	-	-		40	B	0.4	1
16.	*Glycosmis pentaphylla*	-	-	6	2		40	B	1.6	4
17.	*Piper nigrum*	-	-	1	-	1	40	B	0.4	1
18.	*Myxopyrum serrulatum*	1	-	-	-		20	A	0.2	1

Table 5. Community analysis of tree species present in various quadrats in the Rubber plantation

No.	Name of plants	Quadrats					Frequency	Frequency class	Density	Abundance
		1	2	3	4	5				
1.	*Hevea braziliensis*	*8*	9	5	6	5	100	E	6.6	6.6
2.	*Cocos nucifera*	*1*	-	-	-	-	20	A	0.2	1
3.	*Areca catechu*	*I*	9	-	-	-	40	B	2	5
4.	*Tectona grandis*	-	4	5	-	-	40	B	1.8	4.5
5.	*Artocarpus hirsuta*	-	6	4	2	-	60	C	2.4	4
6.	*Artocarpus heterophylla* -		-	I	-	-	20	A	0.2	1
7.	*Thespesia populnea* -		-	-	I	-	20	A	0.2	1
8.	*Mangifera indica* -		-	-	I	-	20	A	0.2	1
9.	*Swietenia mahagoni* -			-	I	-	20	A	0.2	I

Table 6. Community analysis of shrubs and climbers present in various quadrats

No.	Name of the plant	1	2	3	4	Frequency	Frequency class	Density	Abundance
1.	*Ichnocarpus frutescens*	11	4	3	-	60	C	3.6	6
2.	*Vitis cordifolia*	3	1	-	-	80	D	1.2	1.5
3.	*Hibiscus furcatus*	2	1	-	- 1	60	C	0.8	1.3
4.	*Clerodendron infortunatum*	4	5	1	- 25	100	E	11.4	11.4
5.	*Caryota urens*	2	2	1	-	60	C	1	1.6
6.	*Macranga indica*	-	2	-	- 1	40	B	0.6	1.5
7.	*Cycas circinalis*	1	0	-	-	20	A	0.2	1
8.	*Cinnamomum zeylanicum*	1	-	-	-	20	A	0.2	1
9.	*Ficus asperima*	-	1	-	-	20	A	0.2	1
10.	*Mallotus philippiensis*	2	1	-	-	40	B	0.6	1.5
11.	*Eupatorium odoratum*	-	1	2	1	80	D	1.2	1.5
12.	*Mikania scandeus*	-	-	1	-	20	A	0.2	1
13.	*Canthium didymum*	8	-	-	3	40	B	0.2	5.5
14.	*Vitis pallida*	1	-	-	- 1	40	B	0.4	1
15.	*Zizyphus oenoplia*	1	-	-	-	40	B	0.4	1
16.	*Glycosmis pentaphyHa*	-	-	6	2	40	B	1.6	4
17.	*Piper nigrun*	-	-	1	- 1	40	B	0.4	1
18.	*Myxopyrum serrulatum*	1	-	-	-	20	A	0.2	1

Table 7: Community analysis of herbs present in various quadrats

No.	Name of the plant	Quadrats					Frequency	Frequency class	Density	Abundance
		1	2	3	4	5				
1	*Piper longum*	44	6	23	33	-	80	D	212	26.5
2	*Abrus precatorius*	23	-	-	-	-	20	A	4.6	23
3	*Curculigo orchioides*	9	-	-	2	2	60	C	2.6	4.3
4	*Cyathula prostrata*	30	3	-	-	10	60	C	8.6	14.3
5	*Borreria stricta*	5	2	-	-	2	60	C	1.8	3
6	*Biophytum sensitivum*	6	6	-	2	3	80	D	3.4	4.25
7	*Rungia repens*	4	1	9	-	6	80	D	4	5
8	*Hemidesmus indicus*	26	-	-	-	3	40	B	5.8	14.5
9	*Vigna wightii*	6	-	-	-	2	40	B	1.6	4
10	*Cyan otis papilionacea*	8	1	-	-	-	40	B	1.8	4.5
11	*Elephantopus scaber*	10	-	2	2	3	80	D	3.4	4.25
12	*Gloriosa superba*	2	-	-	-	-	20	A	0.4	2
13	*Anisomeles malabarice*	2	-	-	-	2	40	B	0.8	2
14	*Cyperus rotundus*	4	1	1	3	1	100	E	2	2
15	*Strobilanthes species*	1	-	-	-	-	20	A	0.2	1
16	*Leucas aspera*	-	6	-	-	2	40	B	1.6	4

Table 8. List of medicinal plants recorded from the the Rubber plantation

No.	Name of species	Family
1.	*Cinnamomum zeylanicum*	Lauraceae
2.	*Clerodendron infortunatum*	Verbenaceae
3.	*Zlzyphus oenoplia*	Rhamnaceae
4.	*Glycosmis pentaphylla*	Rutaceae
5.	*Piper nigrum*	Piperaceae
6.	*Myxopyrum serrulatum*	Oleaceae
7.	*Curculigo orchioides*	Amaryllidaceae
8.	*Cyathula prostrate*	Amaranthaceae
9.	*Strobilanthes species*	Acanthaceae
10.	*Hemidesmus indicus*	Asclepiadaceae
11.	*Elephantopus scaber*	Asteraceae
12.	*Cyperus rotundus*	Cyperaceae
13.	*Biophytum sensitivum*	Geraniaceae
14.	*Gloriosa superba*	Liliaceae
15.	*Anisomeles malabarica*	Lamiaceae
16.	*Lcucas aspera*	Lamiaceae
17.	*Abrus precatorius*	Papilionaceae
18.	*Piper longum*	Piperaceae.

2) Rocky area- Kulappara rock

The data obtained from the field survey is given in Tables 9-12. Forty species belonging to 22 families were identified (Table 9) from the area. Most of them were herbs (33 Nos.) or shrubs (7 Nos.). The families Gramineae and Serophulariaceae having showed maximum representation of species (4 sps. each) followed by Euphorbiaceae, Asteraceae, Rubiaceae, Laminaceae and Commelinaceae each having 3 species. Details of community parameters are given in Tables 11-12. Graphical representation of various frequency classes is given in figures 2-4. The selected plots were surveyed and the number of plant species recorded (Tables 9-13).

Table 9. List of plants collected from the rocky area

No.	Name of plant	Family
	Herbs	
1.	*Cleome burmanii*	Capparidaceae
2.	*Biophytum sensitivum*	Geraniaceae
3.	*Desmodium triflorum*	Leguminosae
4.	*Mimosa pudica*	Mimosiaceae
5.	*Mollugo pentaphylla*	Aizoaceae
6.	*Ludwigia parviflora*	Onagraceae
7.	*Oldenlandia corymbosa*	Rubiaceae
8.	*Borreria stricta*	Rubiaceae

9.	*Borreria hispida*	Rubiaceae
10.	*Ananas sativus*	Bromeliaceae
11.	*Emilia sonchifolia*	Asteraceae
12.	*Vernonia cinerea*	Asteraceae
13.	*Ageratum conyzoides*	Asteraceae
14.	*Vandellia crustacea*	Scrophulariaceae
15.	*Adenosma capitatum*	Scrophulariaceae
16.	*Torenia bicolor*	Scrophulariaceae
17.	*Mimulus orbicularis*	Scrophulariaceae
18.	*Merremia tridentata*	Convolvulaceae
19.	*Convolvulus arvensus*	Convolvulaceae
20.	*Leucas aspera*	Lamiaceae
21.	*Anisochilus paniculatus*	Lamiaceae
22.	*Orthosiphon stamineus*	Lamiaceae
23.	*Sebastiania indica*	Euphorbiaceae
24.	*Euphorbia hirta*	Euphorbiaceae

25.	*Tragia cannabina*	Euphorbiaceae
26.	*Cyperus bulbosus*	Cyperaceae
27.	*Cyperus hyalinus*	Cyperaceae
28.	*Alloteropsis cimicina*	Gramineae
29.	*Saccolepis interrupta*	Gramineae
30.	*Cenchrus ciliaris*	Gramineae
31.	*Cyanotis axillaris*	Commelinaceae
32.	*Cyan otis papilionacea*	Commelinaceae
33.	*Commelina salicifolia*	Commelinaceae
	Shrubs and Succulents	
34.	*Hibiscus furcatus*	Malvaceae
35.	*Bryophyllum pinnatum*	Crassulaceae
36.	*Osbeekia travancorica*	Melastomaceae
37.	*Memecylon edule*	Melastomaceae
38.	*Cactus indicus*	Cactaceae
39.	*Opuntia dellenii*	Opuntaceae
40.	*Canthium parviflora*	Rubiaceae

Table 10: List of herbaceous species identified and studied from the rocky area

No.	Name of plant	Quadrats				
		1	**2**	**3**	**4**	**5**
1.	*Sebastiania indica*	2	4	-	10	-
2.	*Oldenlandia corymbosa*	0	9	-	8	0
3.	*Cleome bunnanii*	2	-	2	12	-
4.	*Mollugo pentaphylla*	4	4	-	-	9
5.	*Borreria stricta*	9	2	4	8	7
6.	*Borreria hispida*	-	8	6	10	9
7.	*Vandellia crustacea*	-	1	-	9	-
8.	*Merremia tridentata*	2	-	12	-	-
9.	*Desmodium triflorum*	2	0	20	10	9
10.	*Ageratum conyzoides*	-	1	-	1	8
11.	*Adenosma capitatum*	-	7	-	-	-
12.	*Mimosa pudica*	-	-	20	9	0
13.	*Cyperus bulbosus*	-	-	12	10	2
14.	*Torenia bicolor*	-	-	-	1	0
15.	*Ananas sativus*	-	-	-	-	8

16.	*Emilia sonchifolia*	2	-	8	-	-
17.	*Biophytum sensitivum*	-	-	7	-	8
18.	*Vernonia cinerea*	-	-	0	-	2
19.	*Euphorbia hirta*	-	-	5	-	0
20.	*Leucas aspera*	-	0	4	-	4
21.	*Tragia cannabina*	-	-	6	-	-
22.	*Anisochilus paniculatus*	-	8	5	-	2
23.	*Cyperus hyalinus*	-	5	-	-	-
24.	*Convolvulus arvensus*	-	8	-	-	-
25.	*Alloteropsis cimicina*	-	0	-	-	-
26.	*Saccolepis interrupta*	-	5	-	-	-
27.	*Cinchrus ciliaris*	-	5	27	-	-
28.	*Ludwigia parviflora*	-	-	8	4	-
29.	*Cyanotis axilaris*	7	-	-	2	0
30.	*Cyanotis papilionacea*	2	8	5	5	-
31.	*Mimulus orbicularis*	4	6	-	-	-
32.	*Orthosiphon stamineus*	-	-	2	-	-
33.	*Commelina salicifolia*	-	-	-	0	2

Table 11: List of shrubs and succulent plants recorded studied from the rocky area

No.	Name of plant	Quadrats				
		1	2	3	4	5
1	*Osbeekia travancorica*	-	4	-	4	-
2	*Memecylon edule*	-	-	4	4	-
3	*Hibiscus furcatus*	-	-	-	4	12
4	*Canthium parviflora*	-	-	-	4	-
5	*Cactus indicus*	-	-	1	-	-
6	*Opuntia dellenii*	-	-	1	-	-
7	*Bryophyllum pinnatum*	37	-	8	16	-

Table 12. Community analysis of herbaceous plants in the rocky area

No.	Name of plant	Quadrats					Frequency (%)	Frequency class	Density	Abundance
		1	2	3	4	5				
1	*Sebastiania indica*	42	4	-	10	-	60	C	11.2	18.66
2	*Oldenlandia corymbosa*	10	39	-	8	10	80	D	13.4	16.75
3	*Cleome bunnanii*	2	-	2	12	-	60	C	3.2	5.33
4	*Mollugo pentaphylla*	4	4	-	-	9	60	C	3.4	5.66
5	*Borraria stricta*	9	2	4	8	17	100	E	8	8
6	*Borreria hispida*	-	8	6	10	9	80	D	6.6	8.25
7	*Vandellia crustacea*	-	31	-	9	-	40	B	8	20
8	*Merremia tridentata*	2	-	12	-	-	40	B	2.8	7
9	*Desmodium triflorum*	2	20	20	10	29	100	E	16.2	16.2
10	*Ageratum conyzoides*	-	1	-	1	18	60	C	4	6.66
11	*Adenosma capitatum*	-	7	-	-	-	20	A	1.4	7
12	*Mimosa pudica*	-	-	20	9	10	60	C	9	15
13	*Cyperus bulbosus*	-	-	12	10	32	60	C	10.8	18
14	*Torenia bicolor*	-	-	-	1	40	40	B	8.2	20.5
15	*Ananas sativus*	-	-	-	-	8	20	A	1.6	8
16	*Emilia sonchifolia*	2	-	8	-	-	40	B	2	5
17	*Biophytum sensitivum*	-	-	7	-	8	40	B	3	7.5
18	*Vernonia cinerea*	-	-	10	-	22	40	B	6.4	17.5
19	*Euphorbia hirta*	-	-	15	-	20	40	B	7	17.5
20	*Leucas aspera*	-	10	4	-	14	60	C	5.6	9.33
21	*Tragia cannabina*	-	-	6	-	-	20	A	1.2	6
22	*Anisochilus*	-	8	15	-	12	60	C	7	11.66

	paniculatus									
23	*Cyperus hyalinus*	-	15	-	-	-	20	A	3	15
24	*Convolvulus arvensus*	-	8	-	-	-	20	A	1.6	8
25	*Alloteropsis cimicina*	-	60	-	-	-	20	A	12	60
26	*Saccolepis interrupta*	-	15	-	-	-	20	A	3	15
27	*Cinchrus ciliaris*	-	85	27	-	-	40	B	22.4	56
28	*Ludwigia parviflora*	-	-	8	4	-	40	B	2.4	6
29	*Cyanotis axillaris*	17	-	-	12	40	60	C	13.8	15
30	*Cyanotis papilionace*	12	8	15	25	-	80	D	12	15
31	*Mimulus orbicularis*	4	36	-	-	-	40	B	8	20
32	*Orthosiphon stamineus*	-	-	12	-	-	20	A	2.5	12
33	*Commelina salicifloia*	-	-	-	50	72	40		24.4	61

Table 13: Community analysis of shrubs and succulent speices in the rocky area

No.	**Name of plant**	**Quadrats**					**Frequency class (%)**	**Frequency class**	**Density**	**Abundance**
		1	**2**	**3**	**4**	**5**				
1.	*Osbeekia travancorica* -		4	-	4	-	40	B	1.6	4
2.	*Memecylon edule*	-	-	4	4	-	40	B	1.6	4
3.	*Hibiscus furcatus*	-	-	-	4	2	40	B	3.2	8
4.	*Canthium parviflora*	-	-	-	4	-	20	A	0.8	4
5.	*Cactus indicus*	-	-	1	-	-	20	A	0.2	1

6.	*Opuntia dellenii*	-	- 1	-	-	20	A	0.2	1
7.	*Bryophyllum pinnatum*	7	- 8	6 -		60	C	12.2	20.33

Fauna

Sampling of animals was carried out in different habitats such as Rubber plantation, rocky area and grassland (Table 14). Quadrat sampling was done and data generated are given below.

Animal diversity of the study area

A population survey on different animal groups was made. Table.15 gives the total number of animals observed in each plot. Highest number of animal population was observed from plot 5 while the lowest number was recorded from plot 7. Class wise data on different animal groups showed that amphibians and reptiles recorded in lowest numbers. Even though the quadrate is 5 x 5 m, the spiders were recorded in highest numbers. Butterfly and avian population showed richness during the study.

Table 14. Details of study plots selected for sampling

Sl. No.	Plots selected	Vegetation type of plot
1.	Plot 1	Rubber plantation
2.	Plot 2	Rubber plantation
3.	Plots 3	Grass land
4.	Plots 4	Rubber plantation
5.	Plot 5	Rubber plantation
6.	Plot 6	Rocky area
7.	Plot 7	Rocky area
8.	Plot 8	Grass land

Table 15. Data on the faunal elements recorded from various plots

Fauna	Plot 1	Plot 2	Plot 3	Plot 4	Plot 5	Plot 6	Plot 7	Plot 8
Spiders	13	8	3	16	17	1	22	NE
Bettles	NE	2	4	9	6	3	3	3
Butterflies	3	5	9	4	13	7	13	12
Amphibians	NE	1	NE	NE	2	5	10	1
Reptiles	1	NE	NE	NE	NE	2	1	NE
Birds	26	26	21	15	29	NE	NE	NE
Total	4/6	5/6	4/6	4/6	5/6	5/6	5/6	3/6

NE- not estimated

Spiders

There were about 239 spiders collected from quadrat counts, which spreads under 14 orders and 26 species (Table 15). Plot wise data showed that highest no of spiders was encountered in plot 13 and lowest number recorded was in plots 5 and 2. In all other plots, the spider population was moderate. Plot wise spider count also showed that common species of the area were *Lycosa pseudoannulata* followed by *Paradosa sumatrana*. Frequency distribution studies record that *Paradosa sumatrana* formed the most frequent species of the study area than *Lycosa pseudoannulata*. The occurrence of the giant crab spider and the crab spider from the study area is worth to be mentioned. The rarest species *Cryptothelus sundaica* was also reported from the study site (Table 16). This is the first ever report of the species after 1901 from any part of the world (Sebastian, *Pers. Comm*.). Calculation of species diversity index revealed that plot 11 had maximum diversity and plot 2 had the lowest.

Table 16. List of Spiders recorded from the study area

Sl. No.	Family	Scientific Name
1.	Oxyopidae	*Oxyopus ratnae* *Oxyopus javanus*
2.	Lycosidae	*Paradosa amkhaensis* *Paradosa sumatra* *Lycossa pseudoannulata* *Lycosa titsa* *Lycosa* sp. *Hippasa agelenoides* *Arctosa* sp.
3.	Cryptothelidae	*Cryptothelus sundaica*
4.	Sparasidae	*Heteropoda nilagiriensis* *H. venetora*
5.	Tetragnathidae	*Tetrognatha mandibulata*
6.	Thomisidae	*Diea virensis* *Thomisius pugilis*
7.	Araneidae	*Cyclosa fissipoda*
8.	Oonopidae	*Oonopus* sp.
9.	Loxoselidae	*Loxoscles* sp.
10.	Saltiridae	*Hylus* sp. *Hylus diardi* *Telemona dimidiata* *Bianar carti* *Epeus* sp.
11.	Clubionidae	*Clubiona* sp.
12.	Ctenidae	*Ctenus indicus*

Amphibians

Only ten species of amphibians were identified from the study area (Table 17). Ground dwelling species such as *Rana limnocharis* and *Philautus* sp. Were recorded in higher numbers from the study area. The green frog *Rana hexadactyla* is recorded from the paddy field. Even though calculations were made on the species diversity index of amphibian population was

made, no exact prediction is possible due to low numbers of amphibian species during the estimation.

Table 17. List of amphibians recorded from the study area

Sl. No	Order/Family	Old name	New name
1.	Ranidae	*Rana temporalis*	*Rana temporalis*
		Rana malabarica	*Rana malabarica*
		Rana keralensis	*Limnonectus keralensis*
		Rana limnocharis	*Limnonectus limnocharis*
		Rana cynophlyctis	*Euphlyctis cyanophlyctis*
		Rana hexadactyla	*Euphlyctis hexadactyla*
		Rana tigrina	*Holobatrachus tigerinus*
2.	Rhacophoridae	*Philautus* sp.	*Philautus* sp.
		Polypedatus maculatus	*Polypedatus maculatus*
3.	Bufonidae	*Bufo melanostictus*	*Bufo melanostictus*

Reptiles

Reptilian population of the study area comprise only *Mabuya carinata*, *Hemidactylus* Sp. and *Calotes* sp.

Butterflies

Butterfly population was studied in eight different quadrates whose characteristics are given in Table 7. Table 18 gives a list of butterflies identified from the study area. The butterflies collected belonged to 6 different families. Species wise data obtained from the quadrat count showed that *Talicada nyseus nyseus* was the most common species. Plots 8 and 5 contained maximum number of species (Table 19).

Table 18. Checklist of butterflies in the study area

Sl. No.	Family	Common Name	Scientific Name
1	Pieridae subfamily: Coliadinae	Common emigrant	*Catopsilia crocale*
		Common grass yellow	*Eurema hecabe*
		Emigrant	*Pieris* sp.
		Psyche	*Leptosia nina nina*
		Jezebel	*Delias eucharius*
		Glassy blue tiger	*Danais aglea*
		Blue tiger	*Triumala limniace leopardus*
3.	Nymphalidae		
		Common castor	*Ergolis merione merione*
		Chocolate pansy	*Precis iphita iphita*
4.	Lycaenidae Subfamily: Lycaeninae		
		Common Cerulean	*Jamides celeno celeno*
		Red pierrot	*Talicada nyseus nyseus*
			Celaenorrhinus sp.
	Subfamily: Baorinae		*Baoris* sp.
6.	Papilionidae	Common rose	*Pachliopta aristolochiae*

Table 19. Data on the number of recorded from the various plots

Plot No.	No. of species recorded	No. of individuals recorded
1	2	3
2	1	2
3	2	2
4	1	1
5	5	10
6	2	6
7	3	11
8	6	10
Total	**22**	**45**

Birds

Bird population of the area was studied in ftve different transects. Seventeen species of birds were identified from the study area (Table 20). Plot-wise data on the individuals (125) and species observed is given in Table 21. Plot 5 recorded maximum number of species and plot 1 contained maximum number of individuals. Table 22 gives the data obtained from the transect count conducted in each plot. The data also gives the idea that the common crow was the most frequent bird recorded from all the plots, followed by the kite and the kingfisher or kite is the least frequent bird of the area.

Table 20. List of birds observed from the study area

Sl. No.	Common Name	Order & Family	Scientific Name
1.	Indian Pond Heron	Order: Ciconiformes Family: Ardeidae	*Ardeola grayii Grayii*
2	Cattle Egret	Order: Ciconiformes Family: Ardeidae	*Babulcus ibis coromandus*
3.	Snake bird	Order: Ciconiformes Family: Anhingdae	*Anhingida rufa*
4.	White Breasted King fisher	Order: Ciconiformes Family: Alcedinidae	*Halcyon smymensis*
5.	Lesser Coucal	Order : Cuculiformes Family: Centropodidae	*Centropus toulou*
6.	Common Crow	Order : Passeriformes Family: Corvidae	*Corvus splendens*
7.	Jungle owl	Order : Passeriformes Family: Corvidae	*Corvus macrohyn vagabunda*
8.	Tree Pie	Order : Passeriformes Family: Corvidae	*Dendrocitta vagabunda*
9.	Black Drongo	Order : Passeriformes Family: Dicruridae	*Dicrurus adsimilis*
10.	Racket Tailed Drongo	Order : Passeriformes Family: Dicruridae	*Dicrurus paradiseus*
11.	Sparrow	Order : Passeriformes Family: Passeridae	*Passer domesticus*
12.	Jungle Babbler	Order : Passeriformes Family: Silvidae	*Trudodies siriatus*

13.	Sun bird	Order: Passeriformes Family: Nectarinidae	*Nectarinia asiatica*
14.	Wood peeker	Order: Piciformes Family: Picidae	*Dinopium Javanense*
15.	Green Barbet	Order: Piciformes Family: Megalamidae	*Mgalaima viridis*
16.	Common Pariahkite	Order: Cicniifprmes Family: Accipitridae	*Milvus migrans*
17.	Bee Eater	Order: Coraciiformes Family: Meropidae	*Merops leschenaulti*

Table 21. Plot-wise data on the birds observed from various plots

Sl. No.	**Total number of individuals**	**Total number of species**
Plot 1	33	10
Plot 2	29	8
Plot 3	22	4
Plot 4	15	8
Plot 5	30	12
Total	**129**	**42**

Table 22. Plotwise data of birds in the transect count

Sl. No	Species Observed	Plot 1	Plot 2	Plot 3	Plot 4	Plot 5	Total
1.	Indian Pond Heron	1	0	0	0	3	4
2.	Cattle Egret	2	0	0	1	5	8
3.	Snake bird	2	0	0	0	2	4
4.	King fisher	1	1	0	0	0	2
5.	Lesser Coucal	3	0	0	1	1	5
6.	Common Crow	8	9	6	6	8	37
7.	Jungle Crow	4	5	2	0	1	12
8.	Tree Pie	0	3	0	1	1	5
9.	Black Drongo	0	1	0	1	1	3
10.	Racket Tailed Drongo	0	0	0	1	1	2
11.	Sparrow	6	0	0	1	0	7
12.	Jungle Babbler	0	0	7	0	0	7
13.	Sun bird	0	0	0	0	2	2
14.	Wood peeker	4	0	0	0	2	6
15.	Green Barbet	0	2	0	2	2	6
16.	Kite	2	4	7	2	0	15
17.	Bee Eater	0	4	0	0	0	4

3. SUMMARY AND CONCLUSIONS

Biodiversity of selected landscapes at five different locations was studied with active participation of College teachers and students. Cheruvathur Grama Panchayath (Nehru College, Kanhangad); Muthur (MES College); Paliyamangalam, Ayilamudichi Hills, Nemmara (NSS College, Nemmara): Karoor Grama Panchayath (St. Thomas College, Palai) and Pramadom Grama Panchayath (Catholicate College, pathanamthitta) were the areas covered in this study with the assistance of local colleges indicated in parenthesis.

Cheruvathur Grama Panchayath

In the case of Cheruvathur Grama Panchayath, the floristic study was confined to angiosperms. A total of 295 species of plants, coming under 239 genera, spread over 82 families were recorded. Trees, shrubs, herbs, climbers and epiphytes were common in the study area. The family Fabaceae with its 36 species showed higher diversity followed by Rubiaceae. The flora contained a high proportion of medicinal plants such as *Tinospora cordifolia* (Chittamruth), *Sida rhombifolia* (Kurunthotti), *Helicteres isora* (Itampiri valampiri), *Oxalis corniculata* (Puliyarila), *Aegle marmelos* (Koovalam), *Glycosmis pentaphylla* (Panal), *Azadirachta indica* (Veppu), *Eclipta alba* (Kayyooni), *Eclipta alba* (Kayyooni), *Biophytum reinwardtii* (Mukkutt), *Calotropis gigantea* (Erikku), *Gymnema sylvestre* (Chakkarakkolli), *Hemidesmus indicus* (Nannari), *Justicia gendarussa* (Vathamkolli) and *Phyllanthus amarus* (Keezharnelli). The tree flora included several commercially important species such as *Hydnocarpus alpina* (Marotti), *Bombax malabaricum* (Ilavu), *Xanthoxylum rhetsa* (Kumitti), *Pterocarpus santalinus* (Rakthachandanam), *Cassia fistula* (Kanikonna), *Albizia lebbeck* (Vaga), *Leucaena leucocephala* (Subabul), *Achras sapota* (Sappota), *Mimusops elengi* (Elanji), *Tectona grandis* (Thekku), *Vitex altissima* (Mylellu) and *Vitex negundo* (Nechi).

With regard to the fauna, seven families of butterflies, four families of anurans, six families of reptiles, 30 families of birds and 13 families of mammals were recorded from the study area. Among butterflies, several rare species such as *Papilio buddha* (Buddha Peacock), *Papilio*

liomedon (Malabar Banded Swallow tail), *Papilio paris tamilana* (Paris Peacock), *Cirrochora thais* (Tamil Yeoman), *Hypolimnas bolina* (Great Egg fly), *Hypolimnas misippus* (Danaid Egg fly), *Phalanta phalanta* (Common Leopard) and *Castalius rosimon* (Common Pierrot) were present. Among amphibians, the anurans *Ansonia ornate* (Malabar Torrent Frog) and *Rhacophorus malabaricus* (Malabar Gliding Frog) were interesting. The reptilians included *Lissemys punctata* (Indian Flap shell Turtle) and *Varanus bengalensis* (Indian Monitor Lizard). The bird fauna was rich containing several species such as *Milvus migrans* (Pariah Kite) and *Haliastur Indus* (Brahminy Kite), *Athena brama* (Spotted Owlet), *Glaucidium radiatum* (Jungle Owlet) and *Otus bakkamoena* (Collard Scops Owl). The mammals included *Pteropus giganteus* (Indian Flying Fox), *Megaderma lyra* (Indian False Vampire), *Paradoxurus hermaphroditus* (Palm Civet) and *Felis chaus* (Jungle Cat).

Of the various ecosystems in the area, the laterite plateau supported greater number of species consisting mostly of aquatic and semi aquatic plants during the wet phase. But during dry season, the number is comparatively less and the area is dominated by grass. Species richness index was higher in general Lateritic plateau and in the sacred groves. Species richness was low in the settlement area and the paddy fields which was attributed to the human interference at these habitats.

Muthur Grama Panchayath

In the case of Muthur Grama panchayath, 45 species of plants belonging to trees, herbs, and shrubs were recorded which included various ornamental and medicinal plants. Data pertaining to traditional use of various species as vegetables or medicines was also generated. Trees present in the area included ornamental, commercial and fruit trees such as *Cassia fistula, Tectona grandis, Anona squamosa, Artocarpus hirsutus, Psidium guava* and *Mangifera indica* in addition to agricultural crops such as arecanut and coconut. Various medical plants such as *Sida acuta* and *S. rhombifolia* were present. With regard to the fauna, different types of spiders; 24 species of butterflies, six of amphibians, five of reptiles and 30 of birds have been recorded. The spiders identified included the speckled band four leg (*Argiope anasuja*), Box long legs (*Crossopriza lyoni*) and Mygalomorph. With regard to butterflies, the Common crow

(*Euploea core core*), Blue Tiger (*Tirumala limnicace*), Red pierrot (*Telicada nyseus*), Common pierrot (*Castalius rosimon*), Common sailor (*Neptis hylas*), Common grass yellow (*Eurema hecabe*), Grey pansy (*Precis atlites*), Crimson rose (*Pachliopta hector*), Common leopard (*Phalanta phalanta*) and the Common emigrant (*Catopsilia crocale*) were common during wet and dry seasons. Among amphibians, Jerdon's Bull Frog, Martens Bush and Indian Cricket Frog (*Limnocetes limnocharis*) were recorded. The latter preferred grasses in coconut plantations and in fields than in water, exhibited a great deal of morphological variations. More number of individulas belonging to *Limnocetes* sp. and *Rana tigrina* were observed in fields rather than in coconut plantations. Therefore, the disappearance of paddy fields may harmfully affect their population. The reptilians included the Buffer striped keel back (*Amphiesama stolata*), the common garden lizard (*Calotes versicolor*), the Brahminy Skink (*Mabuya carinata*) and snake skink (*Lygosoma punctatus*). Birds recorded included Black headed Oriole, Purple rumbed sun bird, Purple sun bird and Egrets. The latter were more common in wet lands. The Golden Oriole and Black headed Oriole were more in number during the months of August to April.

Paliyamangalam

In Paliyamangalam, Ayilamudichi Hills, four species of fungi (*Pleurotus florida, Irpex* sp., *Lentinus squarosulus* and *Microporus)* and crustose lichens that adhere on rocks and tree trunks; the bryophytes *Funeria* sp. and *Cyathodium* sp.; the pteridophytes *Selaginella, Adiantum, Dryopteris, Lygodium scandens* and *D*ryneria; the aquatic plants Azolla and *Marselia minuta*; various monocots (grasses); Cyperaceae, Arecaceae and Zingiberaceae have been recorded. Medicinal plants such as *Sida cordata* and *S. rhombifolia, Peperomia pellucida, Aristolochia indica, Mucuna prurita* and *Ocimum basilicum* trees such as *Terminalia arjuna, Annona squamosa, Xylia xylocarpa, Santalum album, Bombax malabaricum* and *Tectona grandis* have been recorded from various ecosystems. The fauna comprised of several species of rare butterflies including *Phalanta phalanta* and *Castalius rosimon*; exotic mollusks (*Achatina fullica*) and *Vaginulus* sp.; birds such as Malabar grey hornbill, Wagtails and and wild mammals such as Sambar deer, spotted deer and wild cat.

The fauna comprised of various species of Click beetles, Dung roller beetles; 37 species of butterflies; eight species of primary and secondary freshwater fishes; Land snails and fresh water mussels (*Achatina, Vaginulus* etc.); leaches; freshwater fishes (*Anabas, Clarias, Ophiocephalus, Aplochilus, Saccobranchus* etc.); amphibians (*Rana* spp., *Bufo* spp., *Hyla* spp., *Cacopus* spp., etc.); lizards, dwarf geckoes and skinks; 23 species of birds which included the Malabar grey hornbill and Brahmini kite and nine species of mammals (Bat, Spotted deer, Mongoose, Sambar deer, Civet etc.). In general, the moist deciduous forest contained maximum number of species.

At Karror Grama panchayath, two species of gymnosperms and 553 species of angiosperms including 26 species of orchids were identified. Of the angiosperms recorded in this survey, 110 species constituting a little below 20%, are endemic to the Peninsular India. The flora comprised of several riverine tree species such as *Madhuca neriifolia, Leea indica, Mallotus phillipensis, Spatholobus purpureus, Holigarna grahamii, Holigarna nigra* and *Pongamia pinnata*; fruit trees such as *Anona squamosa* and *A. reticulate*; timber species such as *Hopea parviflora, Schleichera oleosa, Tectona grandis, Xylia xylocarpa* and *Vateria indica* and medicinal plants such as *Sida acuta*, *Sida alnifolia, Sida rhomboidea* , *Sida scabrida, Dimocarpus longan*, *Ocimum americanum* , *Ocimum gratissimum, Aristolochia indica*, *Aristolochia tagala, Zingiber officianale*, *Zingiber zerumbet*, *Rauvolfia micrantha* and *Rauvolfia serpentina.* The fauna comprised of several rare / restricted species of butterflies which included the Southern birdwing *Troides minos*, Tamil yeoman *Cirrochroa thais* and White orange tip *Ixias Marianne;* mussels such as *Lamellidens marginatus* (Kakka) and *Pila globosa* (Njavanikka); fishes *Puntias ticto* (Pattar paral); birds such as Malabar Whistling Thrush *Myiophonus horsfieldii*, Peninsular Spotted Babbler *Pellorneum ruficeps* Nilgiri Plain Wren Warbler *Prinia ornate* and mammals such as Jungle Cat *Felis chaus,* Brown Mongoose *Herpestes brachyurus* and Palm Civet *Paradodurus hermaphroditus.*

There were 62 species of grasses, 14 species of orchids and 31 species of legumes. Presence of trees like *Antiaris toxicaria*, *Gymnacranthera canarica*, *Vateria indica*, *Holigarna grahamii* etc., shows the biotic importance of the study area. Altogether, six species of mammals, 46 species of birds, 26 species of butterflies, 21 species of fishes, two of fresh water mussels and

one species of fresh water prawn were recorded. Though small in area the sacred grove Pathi was rich with good bird population. The high number of fishes in the Lalam thodu and high number of birds in the Sacred Groves shows the significance of these habitats in sustaining biodiversity.

In Pramadam Grama panchayath (Pathanamthita), the study was carried out mainly in rubber plantations and rocky patches. The former contained miscellaneous plant species as a result of which the fauna was also comparatively rich. The plants recorded from the study area contained nine species of trees, 18 species of shrubs and 16 species of herbs. Except for commercial timber species such as teak, Mahogany and Thespesia, most of the trees were horticultural or plantation species. The ground flora comprising of herbs and shrubs was mostly composed of common plant species. With regard to fauna, 22 species of butterflies, 17 species of birds have been recorded. In all locations, natural vegetations in lateritic zones, sacred groves and natural forests as well as rivers supported rich biodiversity.

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