Chapter 2

STUDY AREA AND METHODS

Study Area

The present study on Grey Junglefowl was carried out in Periyar Tiger Reserve, Thekkady, South India, from 1996-2002. Periyar Tiger Reserve is located between 9°15' to 9°40' North Latitude, and 76°55' to 77°27' East Longitude on the crest and western slope of the Southern Western Ghats. Administratively the park comes under the Peermade Taluk of the Idukki District of Kerala State. In the east, it shares border with Thirunelveli, Ramanad and Theni Districts of Tamil Nadu, in the south with Ranni Forest Division of Pathanamthitta District, in the west with Kottayam Forest Division of Kottayam district and in the north, partly with Kottayam Forest Division and with Peermade Taluk.

Periyar Tiger Reserve as a protected area has a long history that begins with the construction of Mullaperiyar Dam across Periyar River in 1895 which lead to the formation of Periyar Lake. Forests surrounding the lake was declared as Periyar Lake Reserve by the then Maharaja of Travancore who appointed Mr.C.H.Robinson as the first Game Warden of the Park in 1933. It was later renamed as Nellikkampetti Game sanctuary. Despite the name suggests Periyar has never been sought after by any game hunters. Later in 1950, Rattington Valley-Mount Plateau areas were added to the park to form the current 777 Sq. Km area and was renamed as Periyar Wildlife Sanctuary. The entire park was
declared as a Tiger Reserve in 1978 and the core area as National Park later.

**Physical features**

Altitude of Periyar ranges from 200 m in the west to 2000 m in the east. Kottamalai lying in the northeastern High-Wavy Mountains is the highest peak that stands 2016 m. The undulating terrain gradually slopes from the east to the west. River Periyar and Pamba and their small tributaries and numerous ephemeral streams constitute the drainage. Terrain leaves no scope for upstream or downstream meandering. Riverbeds and most of the foothills are covered with dense vegetation. Being originated with the Archaean rock formation, soil tends to be acidic.

**Temperature**

Climate is cool and humid in the reserve area. Diurnal temperature may rise above 30°C in the western planes and drop below 14°C in the eastern foothills. Being a tropical country, seasons are not well pronounced. No definite cold spells or hot spells occur but diurnal minimum temperature is usually experienced in December-January and diurnal maximum in March-April.

**Humidity**

In general, the forested areas of the Park are highly humid. It varied highly from place to place, from microhabitat to microhabitat and from season to season. Evergreen Forests showed high humidity. In the study area it ranged between 41% and 88%.
Precipitation

Periyar receives an average rainfall of 2500mm. Precipitation patterns are well defined. Southwest monsoon showers start generally in the first week of June and ends in September. Northeast Monsoon showers are received from October to December. Brief pre-monsoon showers are also received in March-April. Fig.2 to 4 shows the precipitation patterns.

Wind

Periyar receives mild winds. A brief period after the northwest monsoon and before the onset of first pre-monsoon lasting approximately less than a month is windy and that falls usually in December or January. Apart from the high altitude grasslands, wind, as a climatic factor has no significant role in shaping the vegetation of the area.

Fig.1 Location of Periyar Tiger Reserve
Fig. 2. Monthly rainfall of 4 different stations during the year 1995
Fig. 3. Monthly rainfall of 4 different stations during the year 1996

Rainfall - 1996

Rainfall (mm)

Months

Jan  Feb  Mar  Apr  May  Jun  Jul  Aug  Sep  Oct  Nov  Dec

Periyar Dam
Thekkady
Mullakkudy
Manakkavalal
Fig. 4. Monthly rainfall of 4 different stations during the year 1997
Plate-2: A view of Periyar Lake and adjoining forests
Fig. 5- VEGETATION TYPES IN PERIYAR TIGER RESERVE
Vegetation

A brief description on the vegetation of Periyar prior to the construction of Periyar Dam was given by Bourdillon (1893). He mentioned that the grasslands of the hills were frequently prone to forest fire and that they are frequently grazed by cattle coming from the eastern side. He also observed that the riverbed of Periyar River harboured marshy vegetation. A detailed scientific classification of the forest types of Kerala was made by Chandrasekharan (1962). The vegetation types of Periyar were described in detail by Srivastava et.al. (1993). Major vegetation types in Periyar Tiger Reserve are Tropical Wet Evergreen Forests, Semi-Evergreen Forests, Moist Deciduous forests, Grasslands, Moist Savannas, Reeds and Eucalyptus plantations.

Tropical Wet Evergreen Forests.

Tropical Wet Evergreen Forests occur mainly in the core area of the park in the eastern foothills and the western lower reaches and also as isolated patches in the buffer area. It stretches over 305 Sq.Km. Canopy is fully closed and stratified. Dominant trees include *Cullenia exarillata, Mesua ferrea, Myristica beddomei*, etc. Reed breaks are often met with especially along river banks as a secondary successional stage which is attributed to human interferences in the past. *Ochlandra spp* predominate in reed breaks.
Semi Evergreen forests.

This vegetation type is predominant in the buffer zone of the Reserve and covers part of the intensive study area of the present study. Canopy is partially closed leaving small openings. Sunlight penetrates more intensively through the semi evergreen canopy than the evergreen canopy that results in dense undergrowth. Tree species like *Artocarpus hirsuta*, *Hopea parviflora*, *Adina cordifolia*, *Polialthia fragrans*, *Canarium strictum* are the dominant ones. This vegetation type covers about 275 Sq.Km. are in the park.

Moist Deciduous Forests.

This type of vegetation is predominant in the intensive study area. Canopy leaves more openings and the undergrowth is dense, rich in annual herbs. Natural undergrowth is often replaced by exotic weed *Lantana aculiata* which grows as dense thickets preventing further regeneration of trees. Dominant species of this Hardwood vegetation type are *Tectona grandis*, *Lagerstroemia lanceolata*, *Terminalia paniculata*, *Pterocarpus marsupium*, *Dalbergia latifolia*. Trees shed their leaves in the dry season adding considerable amount of organic matter to the soil every year. The moist deciduous forest covers 99 Sq.Km. area.

Moist Savannahs

Grasslands with tall grasses and a mosaic of deciduous canopy constitute moist savannahs. Chandrasekharan (1962) describes that this vegetation is of anthropogenic origin resulting from annual fires. Tree species include *Anogeissul latifolia*,
Terminalia chebula, Pterocarpus marsupium, Emblica officianalis etc. Grass species include Cymbaogon spp and Themeda spp.

Montane grasslands (Shola grasslands)

This vegetation type consists of stretches of short grasses and several isolated small patches of evergreen forests at higher altitudes. Grasses comprise Cymbopogon spp, Themeda spp and Chrysopogon spp.

Eucalyptus plantations

As a part of the earlier forest management policy of afforestation of grasslands and for supply of pulpwood for the newsprint industry, Eucalyptus plantations were raised in some portions of the reserve in the western region, mostly in the Vallakadavu range.

Fire

Many areas along the peripheral regions of the park where there are human settlements are prone to annual fires. Vast stretches of grasslands are burned every year near Mangaladevi and Brandippara areas. Grasslands deep inside the park are occasionally burned by poachers or other forest thieves who trespass form neighboring areas. Tribal honey gatherers are known to set fire in order to expose termite mounts that harbour bee hives. Many eucalyptus plantations in Vallakkadavu range failed because of forest fires or their unsuitability to the terrain. Forest fire is a frequent phenomenon in deciduous forests with rich leaf litter in Thekkady area. Forest fire has the impact of converting woodlands
to savannas and grasslands. It checks the natural ecological succession and eliminates non fire-resistant species thereby transforming species rich habitats to oligotypic communities.

**Intensive Study Area**

Intensive study was conducted in selected areas in the buffer zone of Periyar Tiger Reserve, in the Thekkady range. It included the forested tracts between Kokkara and boat landing, between Anavachal and Anchuruli. It also includes the banks of the Periyar Lake which once remained submerged when the maximum water level in Mullaperiyar Dam was 152 Meters. Vegetation of the area is mainly comprised of semi-evergreen forests (Valiyakanam, Anchuruli), moist deciduous forests (Kokkara) and small tracts of evergreen forests (Parayoda).

**Materials and Methods**

Study was conducted in Periyar Tiger Reserve, Thekkady from 1996 to 2002. Two hens were trapped in the field with nylon noose and colour banded with coloured plastic rings for individual identification in the field for studying movement and behaviour. Birds were observed in their habitats using binoculars. Diurnal activity pattern of the bird was closely observed from morning to evening on three consecutive days in a week. Parameters like age, sex, number of individuals, location of sighting, behaviour, selection of feeding sites, duration of feeding at a particular location etc. were noted. Various parameters were measured on every sighting to gather information on the habitat requirements of the
species in relation to the ecological and behavioural attributes. These are described in detail in the chapters concerned.

Food habits were studied by direct observation in the field, by analyzing gut contents of two dead specimens and through analysis of droppings. Fresh droppings (on average 10-15 per month) were collected every month and they were preserved for analysis of the contents. They were later washed, dried and analyzed with the help of a compound microscope with a magnification of 10x10. Detailed procedure including the preparation of reference slide, comparison and identification of food fragments etc. will be discussed in concerned chapters. Gut analysis was conducted only on two specimens which were found dead in the field and no birds were sacrificed for this purpose.

In a bird focal approach, 48 habitat variables on 40 sightings were measured for making correlations.

Roosting sites were located, roosting trees were identified and characteristics recorded for each site. Roosts were located in the field by closely following the bird in the evening and by random search in possible areas. A fairly good collection of droppings scattered on the ground, both fresh and old, below the roosting perch also helped in locating the roost sites. Adult males have the habit of delivering the loud territorial call from the roosting perch or from the nearby branches just before going to roost. Several roosting sites were located by following pre-roosting calls. Roosting tree species were identified at each site. Various
parameters like height of roost, thickness of roosting perch, number of roosting birds in the site, composition of tree species within 5M radius with individual girth (Girth at breast height-GBH) and the percentage of canopy cover were assessed. Activity of the roosting bird at roost site was closely monitored in all the roosts on alternate days in late evenings and early mornings. Roosting time and the time at which the bird came out of the roost were monitored. Five roosts were continuously monitored throughout the year for site fidelity.

Nesting sites located in the field were monitored regularly. Nest site characteristics such as position of the nest, and vegetation characteristics were recorded at each site. Clutch size was noted along with the number of eggs hatched and the number fledged. Intraspecific and interspecific interactions were noted at the nest sites, where the habitat is shared by Red Spurfowl.

Population estimates were taken by line transect and point transect methods, by flush count and call counts in the mornings and evenings. Presence-absence survey was conducted in various parts of the Reserve through direct observation and listening to the calls. Birds were counted along trails and trek-paths in early mornings. Encounter rates were calculated as average number of birds seen per km. for each habitat. (Encounter rate (ER) = total number of birds seen in a trail / total length of the trail). ER indices were derived for various habitats to enable future comparison. For call counts, hearing stations were marked at every 200 m interval along randomly distributed lines that traverse the habitat. Counts
were made in the breeding season when the territorial call is prominent. Number of audible birds with approximate distance and direction with reference to the hearing station were noted. Observations from all hearing stations along a line were made simultaneously by employing field assistants. Line transect method and point transect method were tried in various habitats on a 2 Km length and counts were made in the mornings and evenings.

All statistical analysis were performed with the help of the free statistical analysis package ‘OpenStat’ written by William G.Miller, available in <http://www.statpages.org/miller/openstat/> and SPSS.