CHAPTER III
FORESTS AND VEGETATION

FORESTS

Andhra Pradesh with its varied topography from the high ranges of the eastern ghats and the Nallamalais to the thousand kilometer coast line has given rise to a variety of flora and fauna; semi ever green valleys, moist deciduous forests, dry deciduous forests, dry ever green forests, dry thorn are the major forest types found in the State.

The recorded forest area of Andhra Pradesh State is about 63,776 Sq.Km forming 23% of total area. The per capita forest area is 0.10 ha against the all India average of 0.12 ha. The forest survey of India made an assessment in 1987 of the forest cover within the land declared as forest in the country by visual interpretation of landsat imagery of 1:1 million scale for the period 1981-83. According to the assessment the forest cover was estimated at 50,914 Sq.Km. The forest survey of India made second assessment in 1989 of the forest cover using landsat imagery of the period 1985-87. According to this the forest cover was estimated at 47,911 Sq.Km. This actual forest cover forms about 17.31% of the geographical...
area. On the basis of these figures it may be seen that there has been reduction of 2,283 Sq.Km. of forest cover during the period from 1981-83 to 1985-87. Further the comparative situation of assessments in 1987 and 1989 by density classes reveal that the extent of dense forest cover decreased by 3,045 Sq.Km. and the extent open forest cover increased by 852 Sq.Km.

The Forests are confined to mountain ranges beginning from Tirupathi hills in the south and along the eastern ghats to Mahendragiri in north and to Balagnat mountains in the west. All the plains are devoid of forest trees as they are required for cultivation.

As regards the area or the forests district wise, Khammam with 53% of area, Adilabad with 44% of area, Visakhapatnam with 39% of area, Cuddapan with 32% of area, Chittoor with 30% of area, East Godavari with 30% of area, Warangal with 29% of area, Prakasham with 25% of area, Karimnagar with 22% of area, and Nizamabad with 21% of area, Kurnool with 20% of area is under forests (Table 1 and 2).
GENERAL VEGETATION TYPES

The vegetation types met within Andhra Pradesh as per Champion and Seth (1968) classification are:

1. Tropical semi-evergreen forests,
2. Tropical moist deciduous forests,
3. Southern dry deciduous forests,
4. Northern mixed dry deciduous forests,
5. Dry Savannah forests,
6. Tropical dry evergreen forests,
7. Tropical dry evergreen scrub and
8. Mangrove forests.

1. TROPICAL SEMI-EVERGREEN FORESTS (moist deciduous forests mixed with evergreen elements):

This type of forests occur in a localised manner in small pockets in valleys near the banks of perennial streams and hills at about 800 m where the climatic conditions are favourable with plenty of humus and moisture in the soil. In Sonkaram blocks of Madugula range, Gudem, Sileru, Sapparla, Chintapalli, Dharakonda, Galikonda (Fig. 6A), Minumuluru, Padovalasa, Thanjavananam, some areas near Anantagiri etc., in Visakhapatnam district, Borra blocks of Vijayanagaram district, Tekkali and Pathapatnam of Srikakulam district, Nulakamaddi,
Fig. 6  A. Tropical semi ever green forest at Galikonda near Araku in Visakhapatnam district.

B. Moist deciduous forest between Rollapenta and Bairlutv in Nallamalais in Kurnool district
Maredumilli areas of East Godavari district show this type of forest. Trees of heights ranging from 21 to 30 m, girth of 1-2 m and above are very common. These represent the highest floristic evolution. A number of top storey species are deciduous. The second storey is evergreen. The main trees which form the top storey are *Michelia champaka*, *Mangifera indica*, *Artocarpus lakoocha*, *Dillenia pentagyna*, *Firmiana colorata*, *Bridelia tomentosa*, *Xylocarpa xylocarpa* etc.

2. **Tropical Moist Deciduous Forests**

This type occurs in regions with a rainfall of 1015 mm and above at an altitude of 610 mts. These forests can be subdivided into three categories for the sake of convenience:

(a) Northern tropical moist deciduous forests (sal forests),
(b) South Indian tropical moist deciduous forests,
(c) Southern tropical moist deciduous riverian forests.

(a) **Northern tropical moist deciduous forests**

This type of forest is found in Srikakulam district. In the sal forests *Shorea robusta* predominates and is associated with *Syzygium cumini*, *Xylocarpus* *xylocarpa*, *Haldinia cordifolia*, *Terminalia tomentosa*, *Pterocarpus marsupium*, *Anogeissus latifolia*, *Albizia procera*, *Madhuca longifolia* etc., forming the top storey,
Where as the middle storey is formed by trees like Cleistanthus collinus, Buchanania lanzan, Dillenia pentagyna, Diospyros melanoxylon, Mallotus philippinensis, Careya arborea, Syzygium operculatum etc.

(b) South Indian tropical moist deciduous forests:

These forests are found in parts of Gudem, Rampa agency, parts of West Godavari district, between Roppapenta and Bairluty (Fig. 5B), Gundlabrahmeswaram (Nallamalais) in Kurnool district and Talakona in Chittoor district.

Tectona grandis (this is present only in a few places), Terminalia tomentosa, Xyilia xylocarpa, Anogeissus latifolia, Dillenia pentagyna, Haldinia cordifolia, Mitragyna parviflora, Schleichera triloba, Mangifera indica, Dalbergia latifolia, Albizia odoratissima, A. amara etc., form the top story.

The lower storey is mostly formed by Bridelia retusa, Careya arborea, Grewia tiliaefolia, Polyalthia cerasoidea, Kydia calycina, Semecarpus anacardium etc., with Dendrocalamus strictus forming bamboo breaks.
(c) Southern tropical moist deciduous riverian forests:

Along the courses of rivers and streams in the plains, where alluvial soil is deposited, there are many predominantly exclusive to these areas. It generally forms a very narrow belt along the banks; sometimes it may extend to the higher elevations. The riparian trees may be evergreen or deciduous depending up on the region. This type of forest is present along the banks of river Godavari and other hill streams in a narrow belt. The most common trees in these forests are Terminalia arjuna, Mitragyna parviflora, Tamarindus indica, Bombax ceiba, Harringtonia acutangula, Butea monosperma, Strychnos nux-vomica, Ponjamia pinnata, Syzygium cumini etc.

3. DRY DECIDUOUS FORESTS:

In this type of forests, the trees begin to shed their leaves by about December and between February and May the forest looks very open and at times eyesore; but no area is completely leafless at any one time of the year. Flowering and fruiting are generally far advanced before the first flush of new leaves appears with the conventional showers in April - May. These forests are widely spread in almost all the districts of the State (Fig. 7).
Fig. 7 A. Dry mixed deciduous forest in Wankidi RF in Adilabad district.
B. Dry deciduous teak forest at Bheemnagar RF in Nizamabad district
Anogeissus latifolia is perhaps the commonest tree in these forests. Tectona grandis, Boswellia serrata, Cochlospermum religiosum, Gyracarpus americanus, Shorea roxburghii, Sterculia urens, Strychnos potatorum, Ziziphus xylopyrus, Terminalia spp., Chloroxylon swietenia, Pterocarpus marsupium, Albizia odoratissima, Haldinia cordifolia, Cassia fistula, Diospyros melanoxylon are some of the typical trees.

4. NORTHERN MIXED DRY DECIDUOUS FORESTS:

These forests generally occur at about and above 400m in shallow soils of well drained hill sides. The canopy is closed though uneven and not dense. Most of the species are deciduous. This type of forest is confined to some hill slopes and plateau of Cuddapah district, northern portions of the hills of Chittoor district and southern portions of the Kurnool district adjoining the Cuddapah district and Nidiyal and Cherukupalli of Nalgonda district.

Common among the canopy trees are Albizia amara, A. odoratissima, Anogeissus latifolia, Hardwickia binata, Terminalia chebula, T. tomentosa, T. paniculata, Shorea tumoagglia, Syzygium alternifolium, Sterculia urens, Bauhinia racemosa, Cassia fistula, Dalbergia spp., Emblica officinalis, Lannea coromandelica, Manjifera indica, Pterocarpus marsupium etc.
5. **DRY SAVANNAH FORESTS**:

This kind of forests, formed as a result of intense biotic interference, are scattered throughout the State. The stunted trees are *Emblica officinalis*, *Phoenix humilis*, *Pterocarpus marsupium*, *Terminalia chebula* and these are associated with grasses like *Aristida setacea*, *Arundinella bengalensis*, *Bothriochloa pertusa*, *Brachiaria ramosa*, *Ple uviera triandra*, *Cymbopogon flexuosus*, *Chryophogon aciculatus*, *Panicum* spp., etc.

6. **DRY EVERGREEN FORESTS**:

This type of forests occur in coastal and plains areas with a rainfall of 635 mm and below at an altitude of less than 244 m and on impoverished soils with practically no organic matter and where the top soil is practically non-existent. This type of forest occur in Poolbagh, Velagada of Vijayawada district, Madugula range of Visakhapatnam, Tekkali and Pathapatnam of Srikakulam in south Cuddapah, Sriharikota island near Nellore and Mamandur valley in Chittoor district.

Common species of this forest are *Manilkara hexandra*, *Albizia amara*, *Acacia leucophloea*, *Syzygium cumini*, *Sapindus marmarginatus*, *Erythroxylon monogynum*, *Drypetes sepiaria*, *Gardenia spicata*, *Wrightia tinctoria*, *Atalanta monophylla*, *Cordia dichotoma*,...
Mimusops hexandra, Flacourtia indica, Ochna obtusata, Catunaregam spinosa etc.

7. **TROPICAL EVERGREEN SCRUB FORESTS**

This type of forest is met within almost all drier parts of Andhra Pradesh like the districts of Anantapur (Fig. 8), Cuddapah, Guntur, Nalgonda, Medak and peripheries of forests in other districts.

The main species in this forest are *Acacia chundra*, *Albizia amara*, *Balanites aegyptiaca*, *Anisochilus carnosus*, *Canthium parviflorum*, *Erythroxylon monogynum*, *Flacourtia indica*, *Premna tomentosa*, *Ziziphus* spp., *Dodonaea viscosa*, *Euphorbia antiquorum*, *Dichrostachys cinerea*, *Capparis previspina*, *Maytenus emarginata*, *Carissa spinarum*, *Grewia tenax* etc.

8. **LITTORAL AND TIDAL SWAMP MANGROVE FORESTS**

These are spread over an area of 3,173 Sq.Km constituting 4.98% total forest area of the State. They occur in the coastal districts of Srikakulam, Visakhapatnam, East Godavari, West Godavari, Krishna, Prakasam, Guntur (Fig. 9) and Nellore. Mangrove forests are located near the estuaries of Krishna and Godavari rivers.
Fig. 8 A. Scrub jungle in Eswaramala RF in Anantapur district.

B. Coastal vegetation in Visakhapatnam beach.
Fig. 9. Mangrove vegetation in Guntur district

A. At Nizampatnam

B. At Kothapalem
The species in esturine vegetation are *Avicennia alba*, *A. marina*, *A. officinalis*, *Sonneratia apetala*, *Rhizophora apiculata*, *R. mucronata*, *Bruguiera gymnorniza*, *Aegiceras corniculatum* etc.

**AQUATIC VEGETATION**

The State of Andhra Pradesh is quite rich in streams, ponds, ditches, rivers (Fig. 10 A) and lakes (Fig. 10 B), which harbour a large number of hydrophytic plants (including aquatic and marshy/wet land plants). Most of the ditches and temporary ponds are filled up with water during monsoon, in the second half of which a number of plants of the hydrophytic vegetation appear. These hydrophytes can be classified as 1. Floating hydrophytes 2. Submerged hydrophytes 3. Emergent hydrophytes 4. Wetland hydrophytes.

1. **Floating hydrophytes**:

There are three types of plants in this division basing on the relationship between the plant and the substratum. They are (a) Free floating on the surface of water. In this subtype the plants have no contact with the soil. They float freely on the surface of water and are in contact with air and water.
Fig. 10. Aquatic vegetation

A. Godavari river at Suthermat in Adilabad district
B. Kolleru lake in West Godavari district
Eichhornia crassipes, Lemna perpusilla, Pistia stratiotes, Spirodela polyrhiza and Trapa natans var. dispinosa are common examples for this type.

(b) Attached hydrophytes with floating shoots: These plants are attached to the muddy floor by their roots, but their shoots come out and float on the surface of water. The principal examples of this category are Hygrorhiza aristata, Ipomoea aquatica, Ludwigia adscendens and Neptunia oleracea.

(c) Attached hydrophytes with floating leaves: In this category the plants are attached to the sub-stratum and their stems (mostly rhizome) remain underwater in contact with soil and water while the leaves float on the surface of the water. Aponogeton natans, Limnophyton obtusifolium, Monochoria vaginalis, Nelumbo nucifera, Nymphaea pubescens, N. nouchali, N. rubra, Nymphoides cristatum, N. indicum, Ottelia alismoides, Potamogeton nodosus and Tanagocharis latifolia are common examples.

2. SUBMERGED HYDROPHYTES:

These plants always remain under water surface and can be grouped into two categories viz., suspended submerged hydrophytes and attached submerged hydrophytes.
(a) Suspended submerged hydrophytes: These plants remain submerged in water but have no contact with the soil. Their flowers may or may not come above the water level. ex: *Ceratophyllum demersum*, *Utricularia aurea* and *U. exoleta* etc.

(b) Attached submerged hydrophytes: These plants remain in contact with soil and water. Their vegetative portion remains completely submerged in water, while the flowers may come out of water surface. *Aponogeton eichinatus*, *A. natans*, *Hydrilla verticillata*, *Najas uraminea*, *Laanrosiphon alternirollia*, *Polypleurum stylosum*, *Potamogeton crispus*, *P. pectinatus* and *Vallisneria natans* are found in this type.

3. EMERGENT HYDROPHYTES:

Plants which are attached to soil covered with water but most of their vegetative parts come out of water surface, ex: *Aeschynomene aspera*, *A. indica*, *Ammannia baccifera*, *Bacopa monnieri*, *Cyperus distans*, *C. pangorei*, *Echinocloa colona*, *Fimbristylis* spp., *Hydrophila auriculata*, *Ischaemum ruvogulum*, *Limnophila indica*, *Polygonum barbatum*, *Phragmites karka*, *Typha angustata* etc.

4. WETLAND HYDROPHYTES OR MARSHY PLANTS:

The plants included in this category are rooted
to the soil saturated with water, which may also survive in dried conditions too in the later part of their life cycle. A large number of species are found in this habitat. Some typical ones are Phyla nodiflora, Alternanthera sessilis, Polygonum plebeium, Commelina spp., Clinus lotoides, Caesulia axillaris, Eclipta prostrata, Melochia corchorifolia, Sphaeranthus indicus, Ipomoea carnea, Cynodon dactylon, Murdannia nudiflora, Justicia betonica etc.