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Evergreen, the KFRI Newsletter is currently brought out in March and September each year and is intended for free private distribution within the institute and the Kerala Forest Department. Free copies will also be sent upon request to other persons or institutions connected with forestry activities. The views expressed here are those of the authors and do not necessarily reflect views of the institute. All interested persons are invited to send comments, opinions and short articles for inclusion in the Evergreen. The Newsletter Committee reserves the right to choose among contributions and edit wherever necessary.

Garcinia pictorious - A Promising Avenue Tree

Garcinia pictorious (Roxb.) D' Arcy, (Syn. G. *xanthochymus* Hooker. ex Anderson is a middle sized tree of about 15m in height with a conspicuous coniferous shape and dense foliage of dark green shining leaves. It is widely distributed and adapted to many types of soils. The tree is found in Eastern India to South East Asia and the Western ghats upto 1200m. It is not extensively cultivated except for a few trees in orchards and in cultivated fields of Western Ghats region.

The trunk is straight and young branchlets are quadrangular often dialated below the nodes and axils of the leaves. The branches are slightly drooping and very strong. Flowering generally occurs twice in a year during March-April and October-November, but in some areas like Kodagu district it is observed only once a year (during December-January). Flowers appear in old branches only, usually in the same place where they appeared in the previous season. Fruits are of the size of an orange, yellow in colour when ripe, attractive, smooth, subglobose with a pointed beak on one side. Fruiting is generally twice in a year but this is not regular.

Fruits carry 1-4 seeds, mostly 2 seeds, are seen. Germination takes place in 60 to 80 days after sowing in seed beds. Germination tests with seed lots collected from Karwar, Madikeri and Shimoga showed that percentage of germination varies in different lots from 6-36%, the highest being in seeds collected from Madikeri. The rate of growth of seedlings is very slow, about 10-15 cm in one year. In thirteen years the most vigorous plants have attained only a height of about 5m and girth of about 38 cm The seedlings are found to be useful as a root stock for grafting or inarching mangostein.

The bark, leaves and fruits of the tree are useful in various ways. The bark is used in Assam for dying cotton. The chips of the bark and the thread with the leaves of *Symplocos grandiflora* as a mordant are boiled to obtain a bright yellow colour. Garcinin, another dye found in the bark is probably impure fukugetin. On treatment with 50% caustic potash solution fukugetin yields 3-4 dihydroxyacetophenone, garcinol and fukugenetin.

The fruit has a juicy pulp with a pleasant flavour and is slightly sourish sweet. It is eaten by birds and animals. In Malnad areas the fruit is used in the place of tamarind for curries. It is also used in the preparation of vinegar, preservatives, jams and syrups. The fruit is also found medicinal. From the mature fruits (not ripe) a creamy resinous yellow gamboge is obtained which can be used as a water colour.

The leaves are used to protect timber from termites and insects by spreading a layer of leaves between the walls and the timber during house constructions. Houses dismantled after 60-70 years in Kodagu had still the remnants of leaves with midribs and veins intact. The leaf has a thick waxy coating and rubbery consistency. Extractives from

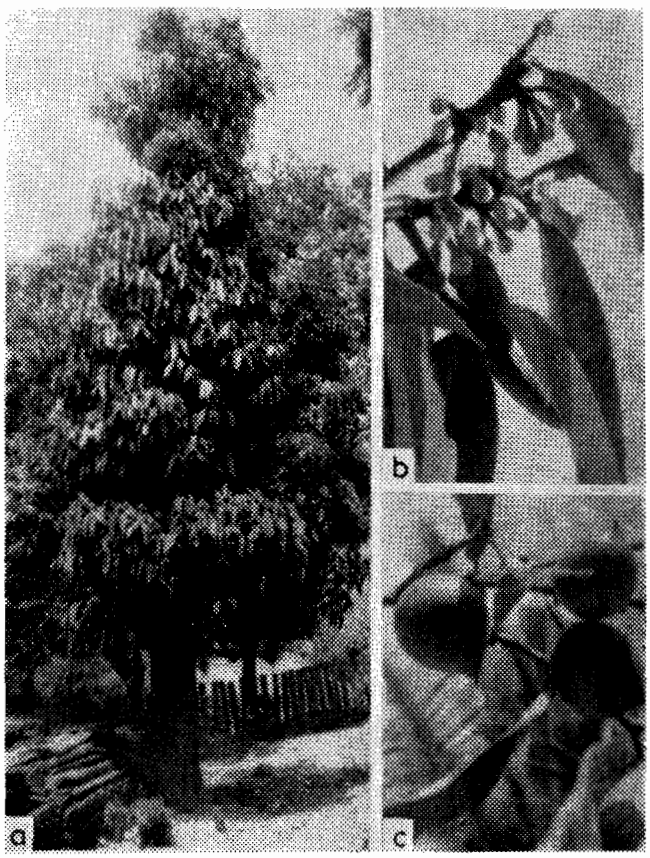

Fig. 1. a. A tree of *Garcinia pictorious* in Acumbe b. flower buds and c. fruits

leaves showed antimicrobial properties. However, no attempt has been made to isolate and characterise the chemicals responsible for antimicrobial action.

Although slow growing, it is a promising avenue tree for town planting since it saves space and its coniferous appearance with short spreading branches will not interfere with electricity and telephone lines. It is also suitable for planting in homeyards since the branching is in whorls one below the other as in *Polyalthia pendula, Terminalia catappa* and does not require pruning.

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Canes in Andamans

Canes occur extensively throughout the forests of Andaman and Nicobar Islands and this Islands are considered the last bastion of canes. Many of the islands are uninhabited and such islands are richer in canes. Even in inhabited areas, canes grow profusely along the farm boundaries and road sides. Cane dominant areas do not extend to such a level to be called cane brakes.

Three genera - *Calamus, Daemonorps* and *Korthalsia* comprising 9 species are reported from Andamans. *Korthalsia* is not reported from the mainland of India. While *C. andamanicus, C. viminalis* and *D. kurzianus* are common in South Andamans, *C. pseudorivalis* is abundant in Middle and North Andamans. *C. palustris, C. longisetus* and *K. laciniosa* are also seen in South Andamans. *C. andamanicus* is prevalent in Middle Andamans also. Another two species of *Calamus* occur in North Andamans.

C. andamanicus and *D. kurzianus* are large diameter canes, 5 to 6 cm in diameter. The common name 'Mota bet' or 'Sanka bet' is applied to both these canes. While *C. andamanicus* is extensively used for various purposes, *D. kurzianus* does not find much use except that the radical leaves are usually used for thatching. *C. palustris* and *C. longisetus*, localy called 'Malai bet' and 'Jungli bet' respectively, also are large diameter canes, the diameter being 3-4 cm. *C. palustris* is not generally used in furniture industry. *C. longisetus* also is not suited for any commercial purpose, since it splits and breaks easily. *C. pseudorivalis, C. viminalis* and *K. laciniosa* are comparatively thin varieties, it can attain only upto 2 cm in diameter. *Korthalsia* is locally known as 'Lal bet' and is preferred for making walking sticks. Leaves are used as elephant fodder. *C. pseudorivalis* 'Safed bet' or 'Razi bet' as it is locally called, is the most useful cane in the Island. This cane finds extensive use in the manufacture of furniture, baskets and walking sticks. As the stem is very strong it is used for rafting timber.

More than half the quantity of canes extracted are used by the Forest Department for making raft of logs for transporting them in water. Canes are widely used here in the manufacture of sports goods, in house construction, as poles for carrying goods, and even as tree guards.

C. andamanicus is a source of drinking water. From one metre cane, about 3 full bottles of water can be obtained The cane is cut and held vertically to collect water.

As a minor forest product, only very little attention is being given for the proper management of this resource. The right to collect canes from the coupes is sold by inviting tenders annually, as is being done elsewhere in the country. Royalty rate is fixed per metre and varies depending on the thickness.

The existing royalty rates are as follows.

1. Mota bet - 35 paise/metre
2. Jungli bet - 21 paise/metre
3. Malay bet - 14 paise/metre

Although, the Islands are very rich in cane resouces, rattan based industry is not well developed. Most of the extracted canes are sent to Calcutta. This is mainly because of the limited demand for finished items within the Islands. Lack of skills and transport problems between the Islands are some other limitations.

Recently, due to severe pressure for raw material from cane industries in India, the resources are depleting at a faster rate in some of the islands. To compensate this Forest Department of Andamans is planning for large scale cultivation of canes.

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Diseases of Forest Trees in Kerala

5. Diseases of Eucalypts in plantations

Eucalypts have been chosen as the most widely planted exotic tree species in Kerala because of their fast growth, adaptability and suitability for pulp and paper industries. So far, about 38,000 ha have been planted with eucalypts in the state; *E. grandis* 14,779 ha and *E. tereticornis*, 23,797 ha. Details of nursery diseases of eucalypts were reported earlier in *Evergreen* No.8 March 1982.

In a disease survey conducted during 1982-85 in eucalypt plantations in the state, a large number of pathogens causing leaf and stem diseases were recorded. Root diseases however were only a few. Most of the serious diseases appeared within the first three years of outplanting. A few were short lived, such as *Botryodiplodia* stem canker, while others continued to affect trees till the end of the rotation reducing the yield. Heart rot, which usually develops at the age of eight to ten years of growth was not recorded during the survey. The diseases recorded during the survey are described below.

1 Cylindrocladium root rot

Causal organism : *Cylindrocladium floridanum*

Occurrence : The disease was observed in a 9 month old plantation of *E. tereticornis* at Cheenkannipalli (Kozhikode Div.) during January 1980. About 10 per cent of the plants were found affected with the disease.

Symptoms : The leaves of the affected plants became flaccid and apical shoot showed drooping. The leaves turned brown and dried up. The root system of such plants was found to be completely rotted with pronounced brown discolouration. The affected plants failed to survive. On dead roots, profuse mycelial growth and sporulation of the causal fungus could be observed (Fig. 1a).

2 Cylindrocarpon root rot

Causal oganism : *Cylindrocarpon lucidum*

Occurrence : The disease was observed in a 5-year-old plantation of *E. grandis* at Thrissillery and in a 1 to 2 year old plantation of *E. tereticornis* at Thalakode, Neriamangalam (Kothamangalam Div.). Incidence of the disease at Thrissillery was less than 1 per cent, whereas at Thalakode it was upto 20 per cent.

Symptoms : In *E. grandis* the initial symptom was wilting and drying up of leaves. The roots of the affected trees became discoloured and showed rotting. The infection generally spread upto the collar area and produced a canker. The affected trees died within 1-2 months. In *E. tereticornis* the leaves of the affected plants especially the bottom ones, turned reddish purple in colour and dried up, no wilting of leaves was observed. The plants were killed within 2-3 weeks after the change in colour of the foliage was noticed. The roots of diseased trees showed browning and rotting (Fig.1b).

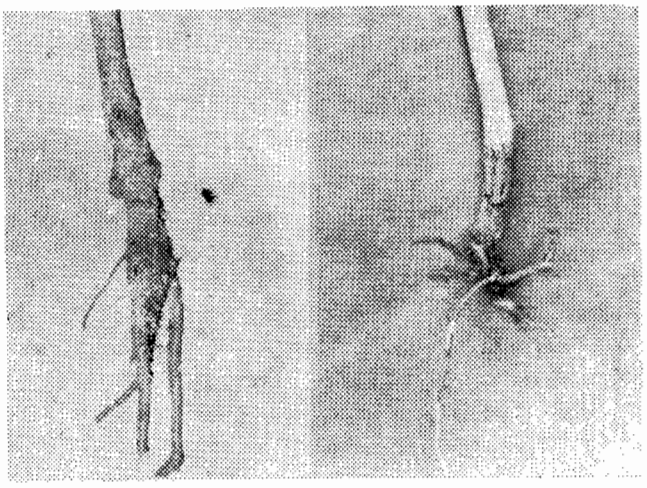

Fig. 1a Root-rot of 9-month old sapling of *E. tereticornis* caused by *Cylindrocladium floridanum* and b. *Cylindrocarpon lucidum*

3 Wilt

Causal organism : *Fusarium oxysporum*

Occurrence : Wilt disease of *E.grandis* was recorded during the monsoon (August/September) in a 2-year-old plantation at Kaikutty, Nelliampathy (Nenmara Div.) and in 1 and 2 year old plantations at Attappara, (Ranni Div.) and Pamba (Kerala For. Dev Corp.). The incidence of the disease ranged between 10 and 25 per cent in various plantations at Pamba. In Nelliampathy, 35 per cent of the plants died due to the disease.

Symptoms : The affected plants showed characteristic symptoms of wilting. Initially the lower foliage became flaccid and dried up. Gradually the wilting proceeded upwards eventually killing the

growing shoot. The wilted plants could be easily located in the plantations because of their dried up leaves. The vascular tissues of roots and stem of the diseased plants showed typical browning, characteristic of vascular wilt.

4 Botryodiplodia stem canker

Causal organism : *Botryodiplodia theobromae*

Occurrence : Fresh infection was mostly recorded during the hot, dry months of December-April. The disease was common in young (1-2 year old) *E. tereticornis* plantations at Kottappara, Varavoor, Potta, Kakkavayal and in Mullaringad and *E. grandis* at Thariode, Noolpuzha and Periya. The incidence varied from 1 to 20%. In plantations, where taungya crop was not grown, incidence of the disease was either very low or nil.

Symptoms : Affected plants showed typical symptoms of physiological wilting i.e, droopy apical shoots with flaccid leaves. Within a day or two the wilted plants died. In all the diseased plants the root collar region was typically constricted and compressed with irregular crevices where occasionally conidiomata of the pathogen were observed. Often the stem just above the canker was abnormally swollen. This swelling was the result of callus growth beneath the bark associated with the infection. Occasionally the splitting and rupturing of the outer bark at the canker resulted in girdling of the stem, and plants died. The tissue of the canker region was brown and dead or dying; sometimes the browning also extended to roots, causing root decay.

Control measures : Although chemical control of a disease of this nature in forest plantations is not economically feasible a soil drench of 0.02% active ingredient of Bavistin to plants with accidental injury may be useful in controlling the disease. Since the canker is manifested through wounds, weeding and other soil operations for the taungya crop must be carried out carefully.

5 Cryphonectria stem canker

Causal organism : *Cryphonectria cubensis*

Occurrence : The disease was first recorded in Wynad during 1980 in a 2-year old *E. grandis* plantation at Thrissillery and 3 and 5 yr. old plantations at Mavinhalla. Later, stem cankers were recorded in most of the *E. grandis* plantations (Less than 3 year old) in high ranges of Wynad District. However, the disease was not so common in *E. tereticornis* grown at lower elevations The incidences of disease varied greatly between localities depending upon eucalypt species and climatic conditions from nil to 30% in various plantations.

Symptoms: The first symptoms seen were slightly sunken, elongate areas measuring about 15-20 cm on the trunk either at the base or above ground, just after the South-West monsoon. The tissue beneath the depressed bark (inner bark) was brown and apparently killed. As canker developed during the dry period (December-April) the bark showed vertical splitting, which increased in length and width with age. At this time gummosis (oozing of kino) was observed in older cankers (2-3 year old). The ruby coloured kino was usually washed down during the rains and imparted a distinct colour to the affected trees by which they could be recognised easily. Though the gummosis was fairly common in *E. grandis*, it was not observed in *E. tereticornis*. Occasionally multiple canker was found on the trunk which became confluent to form long cankerous areas. Usually the canker developed above the ground level and occasionally at the base. Mortality of trees was observed in *E. grandis*, *E. citriodora* and *E. deglupta* (Fig. 2)

Fig. 2. Stem cankers of *E. grandis* caused by *Cryphonecrtia cubensis.*

Influence of canker on coppicing: Observations on coppicing in *E. grandis* (planted in 1975) at Mavinhalla, felled during April 10-17, 1984, were recorded 5 months later in a randomly selected plot of 10 × 50 stumps.

The percentage of stumps sprouted decreased with increasing gummosis due to canker and when the stumps were completely gummosed the sprouts developed from its basal part instead of from the cut edge as it normally occur. On diseased stumps, some sprouts showed proliferation ranging from a few to as many as 34 compared to 6-15 numbers in healthy ones. Because of the large number of shoots in diseased stumps, the shoots remained stunted and weak compared with those on healthy stumps.

6 *Cryphonectria gyrosa stem canker*

Causal organism : *Cryphonectria gyrosa*

Occurrence : This stem canker disease was first recorded at Thrissillery in a 4-year old plantation of *E. grandis* during 1980. Later it was observed at Mavinhalla and Mullachal and in other species such as *E. tereticornis E. torelliana, E. deglupta* and *E. alba* at Kottappara and Vazhachal (Vazhachal Div.). Of the 11 plantations of eucalypts surveyed, this disease occurred only in 4.

Symptoms : The infection occurred on the lower half of stem, often near the ground, during monsoon and by September-October depressed areas, 30-45cm long, on the bark became visible. The tissues beneath the canker turned necrotic and got killed. During the dry period these cankers developed some splitting on the bark. The pycnidia, orange red in colour, developed over the bark arranged in vertical linear rows or scattered during the monsoon. (June-September). The pycnidia produced long, orange yellow tendrils of spores in this period. Characteristic ascomata with long beaks developed during the following dry periods (December-April) on the infected bark, either separately or interspersed with pycnidia. Death of *E. torelliana* trees occurred when the cankers girdled them completely. No gummosis was noticed on the cankers as with *Cryphonectria cubensis*. (Fig. 3a)

7 *Valsa stem canker*

Causal organism : *Valsa eucalypti*

Occurrence : Low incidence of the disease was recorded in young (1 to 4 year old) plantations of *E. grandis* at Thrissillery (9.29 per cent), Mullachal and *E. torelliana* at Vazhachal Div). At Meenmutty (Kerala Forest Development Corp., Idukki), the disease caused extensive juvenile twig and branch cankers in *E. grandis* resulting in die back of > 30 percent plants.

Fig. 3a. Stem canker of *E. torelliana* caused by *Cryphonectria gyrosa*. b. stem canker of E. tereticornis caused by *Valsa encalypti*.

Symptoms : Generally, the cankers were common on twigs, branches and occasionally on main stem. Usually the infection was initiated at the base of the branch, where a canker developed. Over the dead bark numerous black fructifications were produced. Often more fructifications were produced on the lower surface of a branch, away from direct sunlight. The affected twigs and branches died due to complete girdling of phloem tissue.

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Note: Information about few more stem cankers caused by species of *Macrovalsaria, Thyronectria, Hysterium, Cytospora, Nattrassa,* Pink disease caused by *Corticium,* and stem decay with *Microporus* and *Lentinus* sp. will be given in the next issue.

Gale Hit KFRI Campus

A Gale that hit the sylvan campus of the Kerala Forest Research Institute has left about eighty trees uprooted and broken another hundred. Although the devastation did not catch newspaper headlines, this natural calamity was unprecedented atleast in local annals.

Workers of the Electricity Board toiled for a full day to set right the 11 KV line which was destroyed when a *Xylia* (Irul) tree fell over it by an early morning gale on 22nd July 1989. The Board workers completed their work in the evening and electric supply was about to be resumed. Then every thing happened all on a sudden. A more severe gale lashed the campus and trees of all kinds tumbled down one by one. Several trees were uprooted, several trees were broken in the middle and many trees were torn apart from the branching regions. Although the full fury of the gale lasted only for a few minutes, the effect was so devastating. The road that traverses the campus was laden with fallen trees and branches. Electric and telecommunication lines were totally destroyed. Water supplies and transport were also in total disarray.

The south eastern part of the campus was the worst hit where an entire stretch of about one hectre was made barren by uprooting all trees in a clean sweep. There was no discrimination between species. The area was occupied by trees, large and small, belonging to several species. But no species could withstand the abrupt onslaught of nature. Trees of various girth classes belonging to different species, uprooted and broken, during the gale is given in a table.

In a residential campus where rows of houses are constructed for the staff and their families, the nature's fury could have caused damages to houses and claimed even human lives. But nature was surprisingly gentle to human beings although it inflicted minor damages to one or two houses. More damages could have occurred if the quality of construction of the buildings was inferior.

The gale was hailed by the local people at least in one respect. It provided an opportunity for them to collect firewood.

A view of uprooted teak trees

Number of trees uprooted and broken

S. No.	Species	Girth class (cm) 30 - 60		61 - 90		91-120		121-150		151-180		above 180		Total		Grand total
		U	B	U	B	U	B	U	B	U	B	U	B	U	B	
1	*Tectona grandis* (teak)	1	1	4	10	14	16	6	10	—	2	—	—	25	39	64
2	*Dalbergia latifolia* (Rosewood)	—	—	—	—	2	—	1	—	—	1	—	—	3	1	4
3	*Dalbergia lanceolaria* (Velleeti)	—	—	—	—	—	—	—	—	1	—	—	—	1	—	1
4	*Grewia tiliifolia* (Chadachi)	1	—	8	2	10	5	1	7	1	—	—	—	21	14	35
5	*Xylia xylocarpa* (Irul)	1	—	2	2	4	7	—	6	—	—	—	1	7	16	23
6	*Terminalia tomentosa* (Karimaruthu)	—	1	—	—	1	1	5	7	3	2	—	—	9	11	20
7	*Terminalia bellirica* (Thaanni)	—	—	—	—	—	—	—	—	—	—	—	1	—	1	1
8	*Lagerstroemia lanceolata* (Venthekku)	—	—	—	—	1	—	1	—	1	1	—	—	3	1	4
9	*Lagerstroemia reginae* (Manimaruthu)	—	—	—	—	1	1	—	—	1	—	—	—	2	1	3
10	*Cleistanthus collinus* (Odugu)	—	—	—	—	4	3	—	—	—	—	—	—	4	3	7
11	*Bridelia roxburghiana* (Mulluvenga)	—	—	—	—	—	—	—	1	—	—	—	—	—	1	1
12	*Bischofia javanica* (Chola venga)	—	—	—	—	—	1	—	—	—	—	—	—	—	1	1
13	*Albizia odoratissima* (Kunnivaka)	—	—	—	—	—	1	—	—	—	—	—	1	—	1	1
14	*Melia dubia* (Malavepu)	—	—	—	—	—	—	—	—	—	—	—	1	—	1	1
15	*Trema orientalis* (Amathali)	—	—	—	—	—	—	—	1	—	—	—	—	—	1	1
16	*Miliusa tomentosa* (Kanakkaitha)	—	—	—	—	—	1	—	—	—	—	—	—	—	1	1
17	*Pterocarpus marsupium* (Venga)	—	—	—	—	—	—	—	—	1	—	—	—	1	—	1
18	*Hymenodictyon excelsum* (Ithil)	—	—	—	—	—	—	—	1	—	—	—	—	—	1	1
19	*Tetrameles nudiflora* (Cheeni)	—	—	—	—	—	—	—	1	—	—	—	—	—	1	1
20	*Calophyllum inophyllum* (Punna)	—	—	—	—	—	—	—	—	—	—	—	1	—	1	1
21	*Radermachera xylocarpa* (Vedinkorana)	—	—	—	1	—	—	—	—	—	—	—	—	—	1	1
22	*Wrightia tinctoria* (Dhantappala)	—	1	—	—	—	—	—	—	—	—	—	—	—	1	1
23	*Leucaena leucocephala* (Subabul)	—	1	—	3	—	—	—	—	—	—	—	—	—	4	4
	Total	3	4	14	18	37	36	14	34	8	6	—	4	76	102	178
		*(7)		(32)		(73)		(48)		(14)		(4)				

U = uprooted B = broken * Figures in parenthesis indicate total trees in each girth class

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Chinnar Wildlife Sanctuary - Home of the Endangered Grizzled Giant Squirrel

Chinnar Wildlife Sanctuary is located in the rainshadow region of Western Ghats between 10°15' to 10°22'N latitude and 77°05' to 77°17'E longitude. The area comes under Devikulam taluk of Idukki district in Kerala State (Fig. 1). Chinnar was declared as a wildlife sanctuary in 1984. It is bordered in the north and east by Amaravathi reserve forests of Anamalai Wildlife Sanctuary. Kudakkadu reserve forest and Vannanthurai sandalwood reserve forest adjoins the south. The western side of the sanctuary merges with Eravikulam National Park. One can reach Marayur, a place in the south-western part of the sanctuary after a 41 km drive from Munnar. Chinnar, the eastern part of the sanctuary can be approached from Udumalpet. The distance is about 29 km. A 15 km long road that traverses the sanctuary connects Marayur and Chinnar. The sanctuary occupies an area of 90.44 sq. km. Its undulating terrain adds to the scenic beauty. Within a few km radius the altitude varies from 440 m to 2372 m. As a result, there is drastic variation in the climate.

There is wide variation in rainfall and temperature within the sanctuary. Annual rainfall ranges from 300 to 5000 mm while temperature varies from 12°C to 36°C. The rainfall data for about last 80 years show that Chinnar gets only about 48 rainy days in a year.

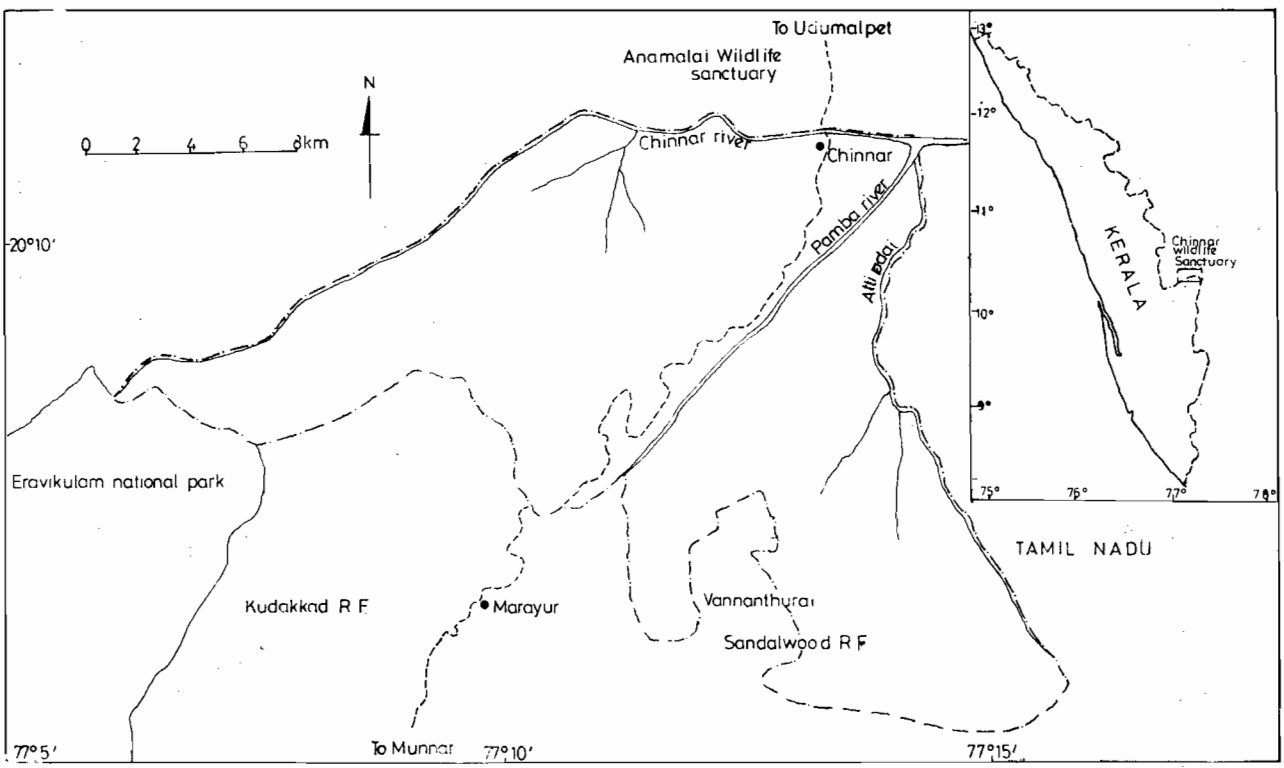


Fig. 1. Map of Chinnar Wildlife Sanctuary and adjacent areas.

Main river which drains the area is the east flowing Pambar and its tributaries. Before it leaves Kerala, Pambar is joined by Chinnar river. River Pambar and its main tributaries are perennial since they originate from the evergreen sholas in the higher reaches of the ghat in the southern and western sides.

Vegetation of the Sanctuary is dry deciduous scrub with xerophytic species dominating and grasslands interspersed. Trees grow on either side

Fig. 2. Endangered grizzled giant squirrel, *Ratufa macroura*.

(riparian zone) of the east flowing Pambar river and its tributaries. Tree species include *Terminalia arjuna, Mangifera indica, Terminalia crenulata, Terminalia bellirica, Tetrameles nudiflora, Melia dubia, Tamarindus indica* and *Pongamia pinnata.* Other areas have trees like *Anogeissus latifolia, Acacia catechu, Careya arborea, Emblica officinalis, Sapindus laurifolia, Randia dumetorum,* etc.

Since this is one of the newly constituted wildlife sanctuaries, not much scientific work has been conducted. In a study carried out by the Kerala Agricultural University in the Champakad Hill Pulaya colony inside the sanctuary, a promising variety of Nelli (*Emblica officinalis*) was located from the area. The fruits of this variety are rich in vitamin C, less in fibre content and the trees yielded more fruits when compared to other varieties. Not much information is available on the animal population studies, except for a census conducted in July 1988.

Second habitat for endangered grizzled giant squirrel in India

During a census conducted in July 1988, grizzled giant squirrels (*Ratufa macroura*) were seen in different areas within the sanctuary. Unlike the Malabar giant squirrel (*Ratufa indica maxima*) which is a colourful species, the grizzled giant squirrel is dull grey in colour often grizzled in appearance and comouflaging with the bark of trees in the area. A detailed survey conducted in about 5 km in the riparian zone of Chinnar resulted in the estimation of 35 individuals. The population in the whole sanctuary area could be about 75 individuals. Riparian forests along the sides of Pambar river and its tributaries were found to be suitable habitat for grizzled giant squirrel. As per the earlier studies only a single population of grizzled giant squirrels, in the

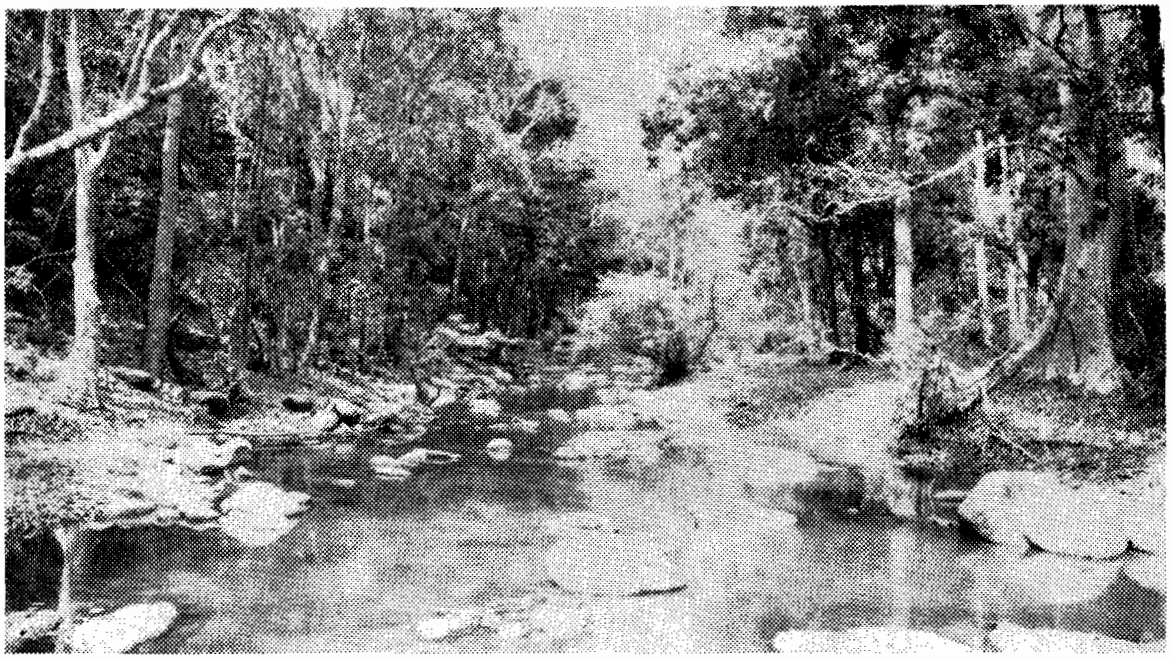


Fig. 3. Riparian forests along Pambar river with huge trees of *Terminalia arjuna*.

proposed Meghamalai Wildlife Sanctuary in Tamil Nadu, is reported from India. Chinnar is about 100 km north of Meghamalai.

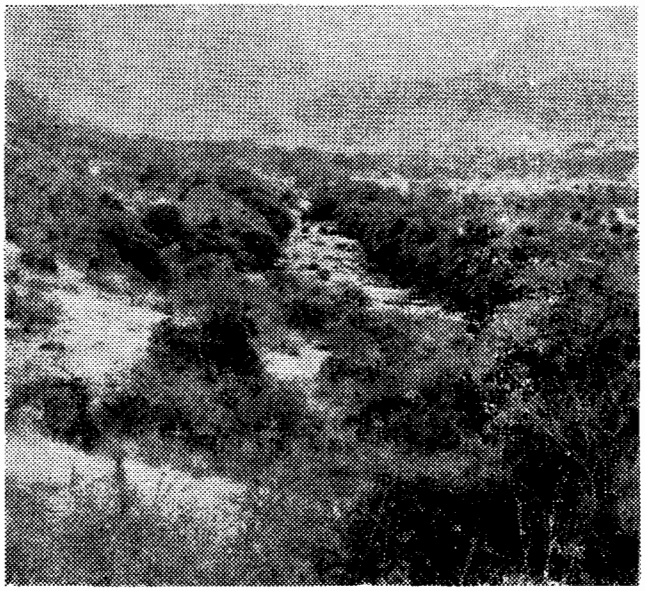


Fig. 4. View of the sanctuary with river Pambar in the middle.

The census revealed that in addition to the endangered grizzled giant squirrel, the sanctuary is a habitat of spotted deer (*Axis axis*), gaur (*Bos gaurus*), sambar deer (*Cervus unicolor*), wild boar (*Sus scrofa*), panther (*Panthera pardus*), Hanuman langur (*Presbytes entellus*), bonnet macaque (*Macaca radiata*), peacock (*Pavo cristatus*) and a variety of birds like small greenbilled malkoha (*Rhopodytes viridirostris*), whitebellied drongo (*Dicrurus caerulescens*) and bush Quail (*Pediculia* sp). Chinnar serves as a corridor for dispersal of wild animals especially elephants and gaur since its western side is contiguous with Eravikulam National Park (which has the largest population of Nilgiri tahr), eastern and northern sides being contiguous with Anamalai wildlife sanctuary in Tamil Nadu.

There are a number of natural salt licks in the Chinnar Wildlife Sanctuary. A cursory look at the area brings evidence of elephant feeding in the natural salt licks in the banks of Atti odai, Mannala area and other similar localities. Evidences of elephants feeding on the bark of certain riverine trees can also be taken as an indication of using the habitat extensively by them. Due to abundance of prey animals such as spotted deer and sambar deer, predators like panthers are more in this area. Since the visibility is fairly good, visitors get chances of seeing panthers in scrub jungles of the sanctuary. The main management problems of the sanctuary are fire, poaching of animals and cattle grazing.

The proposal of Rodger and Panwar (vide Planning a Wildlife Protected area Network in India, Volume II. State Summaries, 1988) to form larger conservation areas by joining Chinnar, Eravikulam National Park, upper Pooyamkutty, Anamalai Wildlife Sanctuary and Kudakkadu reserve, deserves special consideration. These areas are the habitat of three endangered and endemic animals — Grizzled giant squirrel, Nilgiri tahr, and Nilgiri marten. If the proposal is implemented a continuous stretch of about 2000 sq km will be preserved and scientific management will be easy.

K. K. Ramachandran
Division of Wildlife Biology

Distribution of Oriental giant squirrels

The giant squirrels of oriental zoogeographical region belong to the genus *Ratufa*

Giant Squirrels	Distribution
1 *Ratufa affinis*, Cream coloured Malayan giant squirrel	Southern Thailand, Malaya, Sumatra and Borneo
2 *Ratufa bicolor*, Malayan black giant squirrel	Eastern Himalayas, Burma, Southern China to Sumatra, Java and Bali
3 *Ratufa indica*, Indian giant squirrel	Peninsular India
4 *Ratufa macroura*, Grizzled giant squirrel	Sri Lanka, Srivilliputtur forests in Tamil Nadu and Chinnar Wildlife Sanctuary in Kerala

Need For Efficient Sawmill Practices

Sawmilling is a small scale industry in India. An average sawmill in our country is nothing more than a place crowded with some timber logs and sawnwood piles, and in the midst, a few workers performing the noisy sawing operation. Since the traditional practices are still continuing, we do not find here the technological sophistication of modern industries. Machinery, in most of the cases, consists of a horizontal saw and a vertical band saw. A number of such units are common in almost all towns and suburbs, operating with minimum machinery and a handful of skilled workers. Sawmilling is one of the industries which has not received adequate attention in our country.

At present, like all other wood based industries in the country, saw milling industry is also faced with the problem of raw materials. But for the import of wood from Malaysia, many units would have perished. Indications are that the situation will deteriorate further if appropriate measures are not taken immediately. Right now there are only two alternatives before us. One is to continue the *statusquo* and invite a crisis imediately and the other is to avoid such a situation as far as possible, by resorting to improved sawmilling practices and enhancing indigenous production of wood.

Clearly the second option is preferable. Total dependence on imported wood for sawmill and other industrial needs is not a permanent solution. To attain self-sufficiency, besides enhancing wood production, an all out effort is required to economise wood by minimising wastage, and develop techniques for the complete utilization of wood waste. To what extent a sawmill, at its present level, can contribute towards achieving this goal is worth examining.

Raw material quality

The quality of the raw material is a determining factor in every industry. This is more important in saw milling industry. Yield and quality of lumber are very much affected if the logs are defective. There is nothing a sawmill can do except minor cutting manipulations if the defects in the log are related to the natural growth features of the tree. However, certain damages, especially the ones developed during storage are controllable with proper care. For example, end cracks and surface cracks. These develop mainly due to rapid drying of log surfaces after harvesting and during storage. Staining fungi may be another problem, especially in respect of timber species susceptible to fungal attack. Ultimately to eliminate such defects it becomes necessary to trim off these portions The loss is considerable, even though usually we underestimate or ignore it,

Various methods are known for preventing splits and cracks during storage. They include storage of logs in log ponds or shade, constant wetting of logs, endcoating etc. However, they are rarely practiced traditionally. Many mills do not possess enough space or facility for such storage. It should also be mentioned that very often the logs reach the mill site with damages beyond repair.

Accurate sawing

This is an aspect which a sawmill should aim at. in order to minimise wastage and achieve maximum recovery. The quality of sawing depends on many factors; the operator, machine, saw and the helping crew. The headring operator has the key-role. He should be familiar with sawing characteristics of different timbers, cutting patterns and above all with his machine and saw. His aim is always to obtain a straight, thin and uniform kerf for which he should have the ability to quickly locate and rectify even minor imperfections while cutting. Operator is the person to decide the opening plane and sawing pattern for individual log, based on its geometry. The first cut is always crucial as it determines the subsequent cuts and ultimately the out turn. Although, modern techniques like computerised log scanning have been developed in advanced countries for judging the opening face, they are too expensive to be within the reach of an ordinary mill. Therefore even today the operotor's skill and experience are relied upon. To a large extent his task can be simplified by the use of sawyers aids such as laser light lines to indicate the plane of cut, motor load meters for setting appropriate speed, automatic guide positioner for setting saw guides and so on.

The main machines of a sawmill are a headring for primary breakdown and a resaw for secondary

breakdown. The headring is commonly a vertical or horizontal band saw. Resaw is either a smaller band saw or a circular saw. Various other forms of headrings such as double or multiple band saw; single, double or multiple circular saw and gang saw are being used in different parts of the world to suit specific needs of cutting. Same is the case with resaws. Equipment for log transport range from a conventional carriage to a variety of chains running on guides or rails. The log orientation is manually done in majority of saw mills while advanced mills use log turners for this purpose. Whatever be the type of machines or saws used, they should facilitate flawless sawing operation and for this purpose they should be periodically inspected. If any maintenance is required it should be promptly attended to. It is important because machine parts are subject to wear and tear with use, which may cause unwanted vibration of saw or log during cutting. Even minute deflections of saw, log or carriage while sawing can significantly affect the accuracy, leading to wastage of wood material. By accuracy it is meant not only the exactness in thickness of individual piece but also straightness, evenness and width of the kerf. A smooth faced straight cut avoids excessive planning loss which helps to protect the target size.

The saw used for cutting is another crucial factor. It should be of correct pattern, properly sharpened and tensioned. Proper maintenance of a band saw involves much more than mere grinding or filing. Therefore, the term 'sawdoctoring' is generally used for the entire set of precise operations such as tensioning, levelling, end-joining, swaging, grinding etc. Each aspect of sawdoctoring has its own significance and the saw doctor should be able to maintain a high degree of precision in all these operations. Even a good machine may fail to give satisfactory result if the saw is poorly maintained.

Traditionally sawmills in our country use manpower more extensively for various operations connected with sawing. Mill modernisation or automation are not very practical for smaller establishments for economic reasons. Still there is a lot of scope for improvements in our mills in areas such as machine maintenance, sawdoctoring and safety, which do not necessarily involve heavy capital investments. Certain simple sawmill equipments can be locally fabricated to ensure efficient sawing at a lesser cost.

Timber drying and preservation

Ideally, every sawmill should be in a position to supply treated, seasoned timber ready for use. Unfortunately the importance of timber drying or preservative treatment has not been fully recognised. A drying kiln or a treatment plant is considered more as a luxury item than a necessity. In fact, considerable quantity of wood can be saved through seasoning and preservative treatments. All timbers do not have equal durability or stability. Perishable timbers need preservative treatment to enhance their service life. Similarly refractory timbers are to be carefuly dried before use, to prevent warping. There is no better place than a sawmill to carry out such operations.

Utilisation of mill rejects

The problem of waste disposal does not arise in our sawmills because there is heavy demand for mill rejects and sawdust as domestic fuel. Some mills use such residues as energy source for their drying kilns. Obviously, it is not the question of how to dispose it of but how to use it in a more profitable way. There are many possibilities such as production of boards, laminated products, pulp, chemicals, etc. However, adoption of such utilisation technologies calls for a certain level of integration in a sawmill.

Problems faced by the industry

It is also necessary to look into some of the basic problems faced by the industry in order to know the constraints in adopting some of these improved processing practices. The present uncertainties in raw material supply is a constant threat to the very existence of the industry. Under this condition the mill owner is not interested even for a small investment. Further, many of the improved sawmill equipments are to be imported. More often the information pertaining to the latest developments in equipments and techniques is not readily available to the enterprising individuals. Lack of adequate research and training facilities in the country to support the industry is yet another major problem.

Thus, there are many factors directly or indirectly responsible for the slow pace of progress in sawmilling industry in the country. Future of this important forest-based industry depends on how effectively these problems are solved.

K. V. Bhat
Division of Wood Science

Bamboo Information Centre - India (BIC - India)

Considerable interest has been evinced during the current decade to boost production of bamboos to ensure a sustained supply of this raw material to farmers, rural households and industries. Research programmes are undertaken by various agencies throughout the country on the cultivation and scientific management of bamboo.

Information is a vital input for carrying out research programmes successfully. There is need for an agency in the country to collect, organise and disseminate information on bamboo and facilitate exchange of information between scientists engaged in bamboo research.

Recognising this need, the Kerala Forest Research Institute (KFRI) in cooperation with the International Development Research Centre, Canada (IDRC) is establishing a Bamboo Information Centre (BIC). The programme was formally launched in July 1989. Steps are afoot to set up the information centre in modern lines, as part of its library.

BIC envisages to accomplish the following objectives.

— develop and manage databases of Indian bamboo literature, scientists and current research programmes, using CDS/ISIS

— provide search services from the database backed up with a document delivery service;

— publish a half yearly bulletin containing abstracts and research news;

— prepare a compendium on bamboos describing the species recorded from India;

— popularise research results by producing extension bulletins and slide sets

— publish directory of bamboo scientists and current research programmes.

It is expected that the services of BIC will complement and support indigenous research; avoid duplication of research; encourage scientists to interact, promote the application of research results in the field and enable scientists to identify research gaps.

K. Ravindran
Project Leader

AN APPEAL

The objectives of the Bamboo Information centre can be accomplished only with the cooperation and support of institutions and scientists involved in bamboo research. We would appreciate supply of information on current research programmes, details about scientists involved in bamboo research and documents in any language and form for inclusion in the BIC database. We also look forward to opportunities to be of service to all concered with bamboo production and utilisation. Please address your communications to:

K. Ravindran
Project Leader
Bamboo Information Centre
Kerala Forest Research Institute
Peechi - 680 653, Kerala, INDIA

Teak Trees - New Records from Kuttampuzha

Sri. A. K. Goyal, IFS, Deputy Conservator of Forests, Malayattoor Division reports the occurrence of two huge teak trees at Narungutharu in Perumuzhi Beat, Idamalayar Section of Kuttampuzha Range. The place is about 35 km from Idamalayar dam by boat and about 2 km uphill by walk on the left side of the reservoir.

The measurements of the trees are given in the table below along with data of some of the other big trees located elsewhere, for comparison.

It may be seen that the newly found Tree (No. 1) has the highest girth.

	Location	Tree No.	GBH (m)	Height (m)	Year of observation
1.	Perumuzhi beat	1	7.13	35.40	March 1989
2.	,,	2	6.00	35.00	,,
3.	Parambikulam (Konnimara teak)	Nil	6.26	43.00	March 1987
4.	Conolly's plot, Nilambur	23	4.16	47.55	April 1987
5.	Allapally Division, Maharashtra	250	5.27	35.50	October 1988

Know Your Information Sources

The Oxford Catalogue of World Forestry Literature

1822 - 1975, Microfilm, 144 Reels
Oxford Forestry Institute
University of Oxford, Oxford OX1 3RB

Abstracting and indexing services are not only current information search tools, but they are depended upon for retrospective searches. Retrospective searches are very essential as a prelude to any scientific research. Published bibliographies and indexes to literature help a great deal in this respect.

The Oxford Catalogue of World Forestry Literature is a universal bibliography on Forestry available in 144 reels of 35 mm microfilm. It covers literature from 1822 to 1975. The catalogue is organised into various sections as tabulated below :

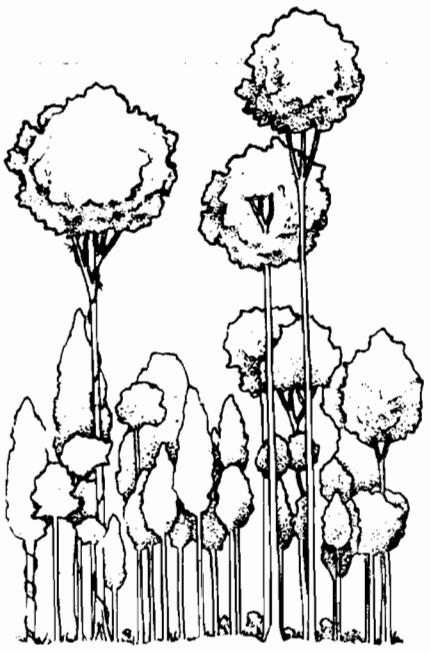
Period covered	Classification used	Arrangement	No. of reels	Code
1822-1933	Troup's Classification	Subject	10	T
1934-1950	Flury's Classification	Subject	21	F
1951-1964	Oxford Classification	Subject	47	C
1965-1970	-do-	Subject	19	2SC
1970-1975	-do-	Subject	19	3SC
1934-1968		Author Alphabetical	28	A

In 1920 the Forestry Department of the Oxford University started to compile an index to the forestry literature available in its library. The Documents were classified according to a system devised by R.S. Troup and recorded in foolscap sheets. In 1933 instead of Troup's system, Flury's system of classification was adopted for classifying documents. In 1951 when IUFRO approved the Oxford System of Decimal Classification for Forestry (ODC) the classification system was changed to ODC and started recording on 5" x 3" card. From then onwards, multiple copies of the cards were prepared and made available to subscribers all over the world. This service was known as Card Title Service (CTS).

What is now available as Oxford Catalogue of World Forestry Literature is a microfilm copy of the entire sheet/card collection available at the Forestry Department of the Oxford University, which was later known as Oxford Forestry Institute. This catalogue is a very exhaustive source to locate any document on forestry. As the catalogue contain literature published from 1822 onwards, old records that cannot be located from Forestry Abstracts can also be located from this catalogue.

A complete set of this catalogue is available at the KFRI Library.

K. Ravindran
Librarian



A Special feature

MAB Regional Training Workshop on Tropical Forest Ecosystem Conservation and Development In South and South-East Asia

Trichur 1-13 May 1989

An International Training Workshop was organised by Kerala Forest Research Institute at Trichur from 1-13 May 1989 to train selected researchers and resource managers from South and South - East Asian countries on problems and methods of conservation and sustained management of tropical forest ecosystem.

Deforestation and loss of quality of the tropical forests which constitute roughly 50% of the world's forest resources is one of the most serious ecological problems of the present times. Conservation plans can be implemented only if the planners and resource managers at local levels are adequately motivated and trained. The Workshop was jointly sponsored by UESCO Regional Office in India through the World Heritage Fund of UNESCO-MAB, International Development Research Centre, (IDRC) Canada, and the Ministry of Environment and Forests, Government of India. Training was given to 21 participants, 12 from India and 9 from other South and South-East Asian countries.

The specific objectives were:

a. To provide an overview of the rationale, scientific principles and the methods of effecting conservation and redevelopment to the trainee participants.

b. To provide opportunities for sharing experiences by arranging case study presentations and group discussions on conservation and redevelopment problems in the countries of the region, and

c. To arrange for a meeting of an ad-hoc group of resource persons to identify, discuss and chalk out proposals for research and training to promote sustainable management of the forest ecosystem in the region.

To accomplish the above objectives the workshop was organised to include the following four components :

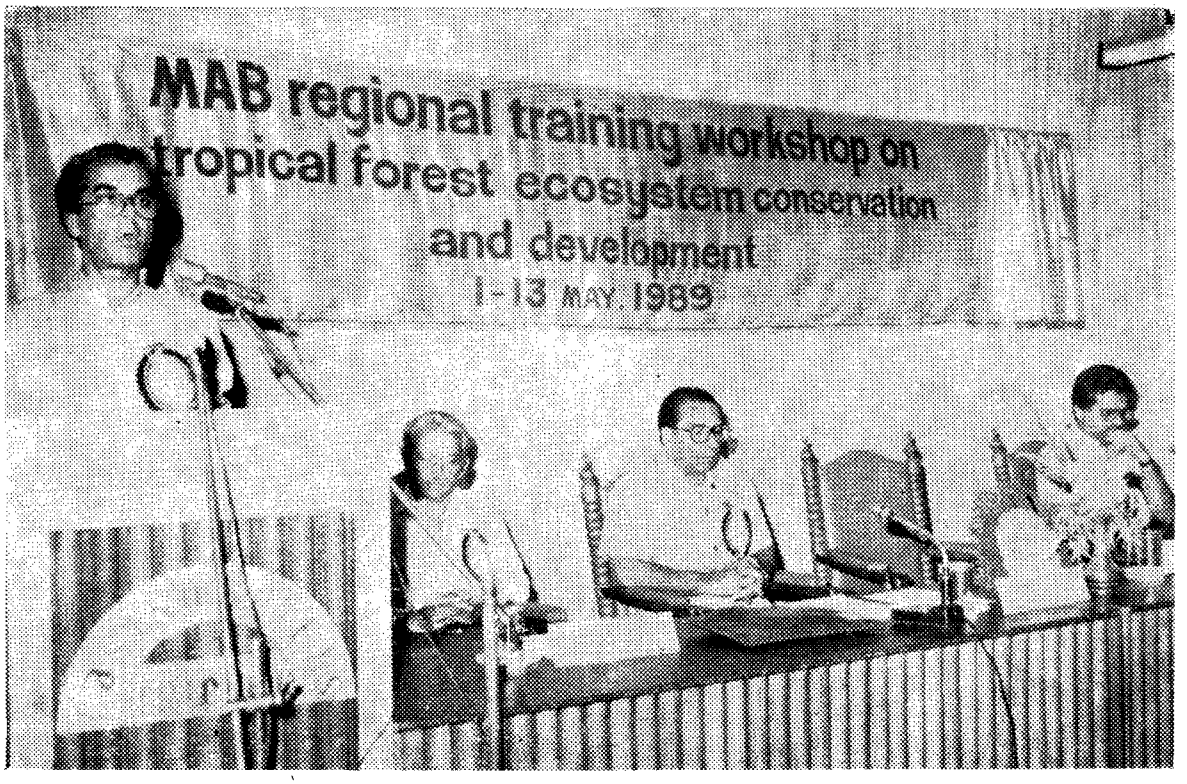
1. Instructional sessions comprising lectures by eminent Scientists and professional foresters selected from India and abroad.

2. Case study presentations by the trainee participants on conservation and redevelopment problems.

3. Field exercises at typical forest sites to expose the participants to problems and methods of research and management.

4. Meetings of an ad-hoc group of resource persons to identify priority areas for action and research.

The lecture sessions covered the following major subjects, with lead lectures and discussions on various aspects of each subject.



Prof. P. S. Ramakrishnan delivers the Presidential address

1. Basic Principles of Ecosystem Functioning
2. Tropical Forest Ecosystem.
3. Biological Conservation
4. Biosphere Reserves
5. Redevelopment of Vegetation
6. Man-Forest Interactions

INAUGURAL FUNCTION

The new understanding of Ecology

This workshop is a reflection of the growing concern of UNESCO over our deteriorating environment. Our new understanding of ecology is neatly summarised by the words of the American Indian Chief who said "Earth does not belong to man, man belongs to Earth".

From the Welcome address of
Dr. K. S. S. Nair
Director (in charge)

Tropical deforestation

The destruction of forests that has taken place all over the tropics during the past few decades has no comparison in the history of our planet and this naturally would have its impact on the very destiny of the poor people that inhabit this zone. Not only

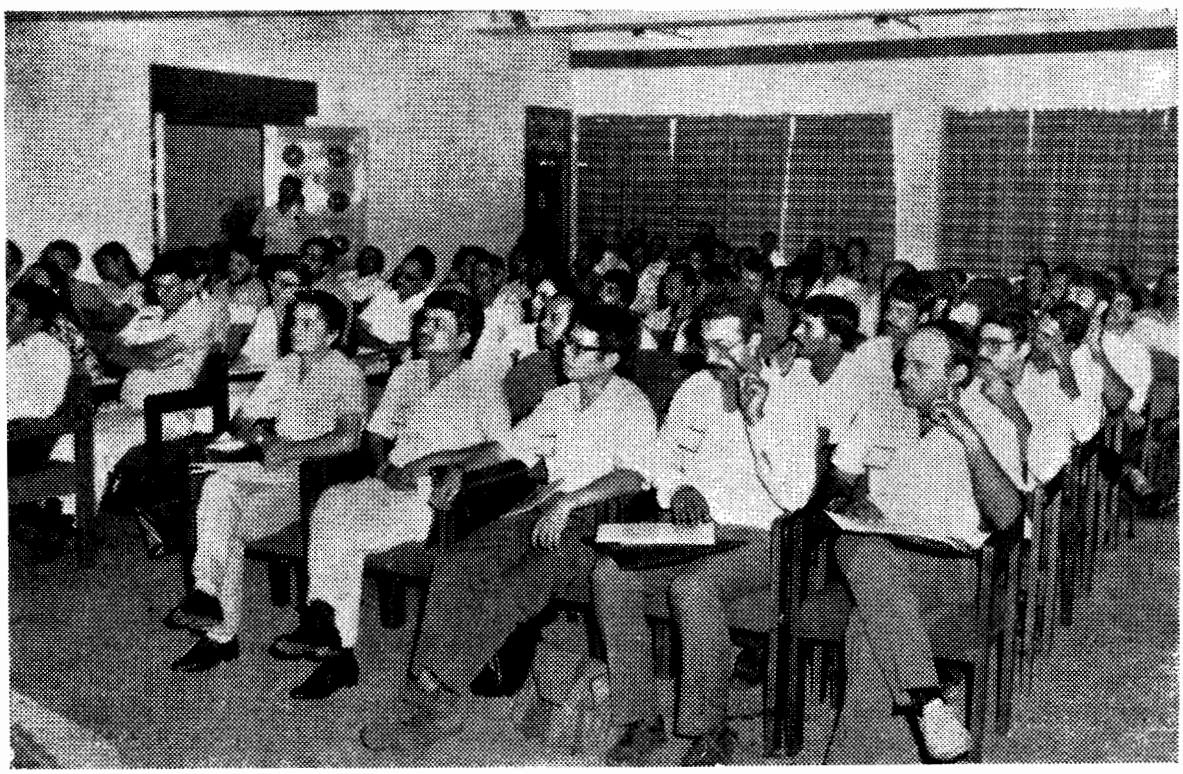
has this wanton, undisciplined, thoughtlessly cruel and lascivious destruction virtually depleted a natural heritage that has been passed down to us through millions of years, this capricious deforestation is continuing at increasing speed at the rate of several hectares per second. Unless determined efforts are made to halt the destruction, the whole of the tropical rain forest may disappear within our own lifetime, except, perhaps for a few inaccessible areas and small 'forest reserves' artificially maintained mainly as sources of timber.

From the Inaugural address of
Prof. N. Balakrishnan Nair
Chairman, STEC, Kerala

Recognise Silent Valley as a World Natural Heritage Site

A cursory examination suggests that Silent Valley fulfills all the criteria laid down by UNESCO for being recognised as a natural heritage site. Apart from the relatively undisturbed status of the rain-forest ecosystem, it has been a source of inspiration for creating mass environmental awareness in the country as a whole and it also brought into focus conflicts between developmental programmes and environment. It also contributed to the concept of sustainable input.

From the Presidential address of
Prof. P. S. Ramakrishnan
Director, G. B. Pant Institute of Himalayan
Environment & Development, Almora



A view of participants

UNESCO'S Man and Biosphere Programme

In Asia-Pacific, the conservation and development of tropical forest is a social and human problem over and above being a problem of scientific and technical investigations. Any environmental problem whose causes would be traced to social, economic and political considerations needs an interdisciplinary and intersectoral approach directing the search for its solutions. The most important emphasis placed by Man and Biosphene Programme of UNESCO has been upon creating a conceptual framework for national agencies to undertake interdisciplinary and intersectoral work on research, training and demonstration projects on issues and problems of land use management.

From the Keynote address of
Dr. N. Ishwaran
UNESCO, Paris

OBJECTIVES AND BASIC PRINCIPLES

Appropriate strategy for restoration

The differentials between early and late successional trees could form the basis for designing an appropriate species mixtures and varying their introduction in space and time.

P. S. Ramakrishnan (Almora)

Concept of ecosystem

The complexities of life of any organism in and around the habitat forms the concept of ecosystem. The three major components of the ecosystem are, the producers, the consumers and the decomposers.

V. M. Meher-Homji (Pondicherry)

High level of Genetic variability

The biochemical technique of enzyme electrophoresis has revealed an unexpectedly high level of genetic variability in a variety of organisms. The more recent technique of DNA restriction fragment length polymorphism (RELP) has confirmed this. The debate now concerns how such a high level of genetic variability is maintained. The nature of this debate is bound to have profound implications both for evolution and conservation.

R. Gadagkar (Karnataka)

TROPICAL FOREST ECOSYSTEM

Biogeography - an aid to conservation

The Forest map of Western Ghats, showing sensitivity of different vegetation types to anthropic pressure, climatic constraints, soil conditions, and topography, are published as a result of the ICAR - French Institute Project. The role of such a study is indispensable in maintaining sustainable development.

V. M. Meher-Homji (Pondicherry)

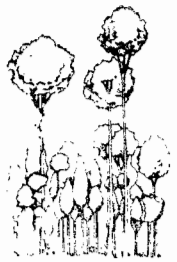
Need for research on nutrient cycling

Nutrient cycling in little disturbed rainforests is immensely complicated and so far we have nothing more than glimpses at some aspects of the process in a few of them. There is need for more research on the nutritional aspects of rainforests if we are to evaluate the consequences of their destruction and best methods by which they can be managed for sustained production.

J. Proctor (United Kingdom)

Short agricultural cycle affect soil fertility

After the destruction of element cycling by slash and burn agriculture, the system rapidly goes through a quick succession and potassium, which is one of



the important elements and highly susceptible to leaching and runoff, losses during cropping and the early phases of regrowth is rapidly conserved in the living biomass. As this process progresses steadily during the first twenty years or more, any disturbance such as in the short agricultural cycle of four to five years, as is now common, is likely to adversely affect the recovery of soil fertility and the element conservation by the system as a whole.

P. S Ramakrishnan (Almora)

BIOLOGICAL CONSERVATION

Nilgiri Biosphere Reserve

In addition to core zones, manipulation forestry zones, tourism zones, and restoration zones, a zone of co-operation may also be established in Nilgiri Biosphere along the boundary of reserve, where education and training in the environmental issues can be taken up involving local people and also provide them employment in the ecorestoration efforts.

R. Sukumar (Karnataka)

Conservation strategies for wet evergreen forests

When there is some prospects for creating new large reserves, the strategy involves determining the range of forest types, area and location. If there is little prospect of creating new large reserves, creating a network of smaller reserves within the existing forest area need to be considered. In degraded lands the strategy is to take advantage of these and not ignore them, although degraded, they do have conservation benefits

David Lamb (Australia)

Strategy for development by the people themselves

The scientists, planners and administrators often have tried to impose from outside developmental plans that they consider are good for the people in the region without trying to understand the processes that operate in traditional ecological systems. The strategy for development should be one with which the local people can identify themselves. Such a philosophy in planning would take care of the traditional value systems and therefore would not only find ready acceptance by the tribal societies but would also ensure their participation in the developmental processes.

P. S. Ramakrishnan (Almora)

Present policy not scientific

Forests have to be regarded as a renewable resource meant for the use of mankind and all efforts should aim at productivity from the forest land in a recycling basis. The present policy is only populistic and not scientific.

N. S. Adkoli (Karnataka)

Use wildlife to conserve

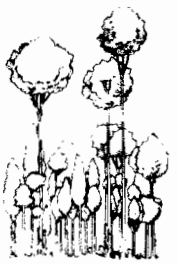
Locking up wildlife will not always be optimal strategy for development. Like the Kangaroo shooting experiments in Australia wildlife should be exploited in a sustainable way.

M. D. Young (Australia)

A sustainable relationship between land and water cycle

The environmental problems of the country could be examined in three ways. 1. land stocks or physical resource base, 2. biological resources, 3. pollution covering both water and air. It is necessary to find out ways to achieve a favourable and sustainable relationship between land cycle and water cycle.

D. C. Das (New Delhi)



BIOSPHERE RESERVES

Local people should benefit

When Biosphere reserves are established the local people should be benefitted to the maximum, so that long term sustainable management would be possible. Biosphere reserves should function as centres of environmental education, research, training and tourism.

N. Ishwaran (Paris)

MAB in India

The objective of MAB is to develop basic units in the natural resources and social sciences for rational use and conservation of natural resources. Of the 14 Biosphere Reserves planned to be established in India, 7 have already been set up.

Subodh Sharma (New Delhi)

MAB in Papua New Guinea

The MAB programme in Papua New Guinea was centered on a large pulpwood logging operation in low-land tropical rain forest at the Gogol Valley. The logging operation sought to use the original forest to create a plantation forest and fund agricultural development in the area.

David Lamb (Australia)

Preference for local interests

Local interests are to be given preference when biosphere reserves are established. A multidisciplinary team under a single administrative set up would be needed for the proper management of the biosphere reserves.

K. Balachandran Thampi (Kerala)

Follow working plans for selection felling

The selection felling system of management in natural forests would be harmful to the ecosystem if prescriptions given in the working plans are not followed strictly.

K. Balasubramanian (Kerala)

Modelling the growth of natural forests

Natural forests are composed of uneven aged mixed species stands. Modelling the growth of uneven aged mixed species is still in the developmental stages because of its complexity and lack of reliable long term data base for model estimation and validation.

K. Jayaraman (Kerala)

ECOSYSTEM REDEVELOPMENT

The Mitraniketan experiment

The attempt for ecodevelopment of Velanad, a village in Trivandrum district by a charitable institution called Mitraniketan has been successful. The history of Mitraniketan, since it is founded in 1956, has been a humble but good example of achieving all environmental care to be emulated by others. We must make the rural population understand what trees and the green cover of the earth do for us.

K. Viswanathan (Kerala)

The Sirsi experience

Indian Institute of Science, Bangalore has been involved in the development of strategies for sustainable utilization of resources and prevention of further damage to the environment in selected ecosystems in Uttara Kannada district in the Western Ghats. The programme is being implemented in the field currently.

N. H. Ravindranath (Karnataka)

Restocking of tropical rain forests

Most typical species of these forests have the capacity to survive under full overhead canopy for 20-25 years without any appreciable growth. However they respond to light when available and resume their normal growth rate. Planting of seral species has a more desirable effect in the degraded forest, which have remained as such for certain period. It is possible to adequately regenerate the tropical rain forest species under plantation conditions and rate of girth increment under such conditions is twice as fast as under natural conditions.

S. N. Rai (Karnataka)

Re-development of vegetation

Overall watershed management, i. e. soil and water conservation followed by reforestation with fast growing, evergreen, drought resistant, multipurpose tree crops in shelter belts, forest plots and orchards, increased the productivity of the land. The type of vegetation best adapted to absorb and maximise solar energy and yearly precipitation was the indigenous mix of species present in small pockets of protected naturally regenerating thickets.

Jean Pouyet (Pondicherry)

Important role for Non-Governmental organisations

Non Governmental organisations like Sastra Sahitya Parishad play an important role in making people aware of the need for ecosystem conservation and for implementing programmes for ecosystem redevelopment.

M. K. Prasad (Kerala)

MAN FOREST INTERACTION

Need for ethnobiological documentation

The most urgent tasks for the future must be exploration and survery of plants and animals used in tribal societies, training of ethnobiologists, creating an ethnobiological database, development of ethnobotanical herbaria, and gardens and conservation of endangered species with ethnobiological value.

J. K. Maheswari (Uttar Pradesh)

Human ecology in Attappady Reserve

With the increased influx of settlers, the tribal land had been encroached and taken possession by settlers. The dispossessed tribals are forced to migrate either to reserve forests or to the arid regions in the eastern parts of Attappady. This has undermined their economic base and resulted in acute poverty in the tribal hamlets. Under the ageis of the biosphere reserve programme a conscious attempt has to be made to achieve thorough ecologically viable management with greatest possible harmony among men, land and natural resources.

S. Sankar (Kerala)

People's participation needed

For an efficient social forestry programme more innovative and cheaper ways of reaching people through non-governmental organisations, school children and the common media is peferable than expanding forest departments for the work concerned.

N. P. Melkania (Madhya Pradesh)

MODERN TOOLS IN CONSERVATION

Statistical modelling in ecology

Two most common problems in ecology where statistical modelling is used are abundance estimation and study of relationships between variables of interest.

A. P. Gore (Maharashtra)

Remote sensing as aid to conservation

With the advent of remote sensing the viable size of an ecosystem that can be taken up for practical studies has become very large. Remote sensing as a tool works out much cheaper in terms of money and man power when large areas are to be surveyed and studied.

N. V. M. Unni (Hyderabad)

For resource management

The remote sensing is of vital importance for resource management in the tropics, because of its ability to supply enormous information in the quickest possible time.

A. R. R. Menon (Kerala)

CASE STUDY PRESENTATIONS

Protection from biotic interference

Natural regeneration in areas portected from fire and grazing was very high when compared to unprotected areas.

M. H. Swaminath (Karnataka)

Wide gap between economic and biological production

Economic production (top and second storey trees) from the secondary dry deciduous forest is far below than the total biological production. As far as mineral accumulation is concernéd the third storey species (shrubs, herbs and stragglers) are the store house of nutrients.

M. George (Tamil Nadu)

Forest trees of Papua New Guinea

The Papua New Guinea land mass has an area of approximately 46 million hectares of which 40 million hectares are covered with forests.

Karl Kerenga (Papua New Guinea)

Biological invasions

There is a need to lay more emphasis on understanding ecophysiological attribute of invader species in order to identify and select the suitable species for afforestation to specific location/environment.

P. Sudhakar Swamy (Tamil Nadu)

Rubber plantations and tropical forest ecosystem

Fully foliated canopies of Rubber trees trasmitted nearly 5% of the incoming photosynthetically active radiation (PAR) as against 0.15 per cent for tropical rainforests. Sunflecks contributed nearly 55% of the total PAR available under *Hevea* canopies, but in a tropical forest ecosystem this was as high as 70%.

K. V. Satheesan (Kerala)

Ecology of Sawokick natural forest

Vegetation analysis showed that there were 32 species of which 13 in vegetation height stage of 150cm, 13 in 30-150 cm and 21 in 30 cm.

Herman Daryono (Indoneisa)

Important role for wood decaying fungi

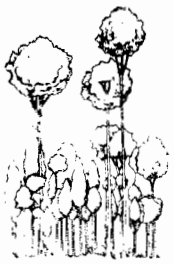
The primary role, wood decaying fungi play in a forest ecosystem is recycling of carbon removed from atmosphere by autotropic organisms during photosynthesis through litter decomposition in forest floors.

N. S. K. Harsh (Madhya Predesh)

Vegetative popagation for superior planting stock

The most commonly practiced technique is rooting of stem cuttings. Rooting ability is influenced by genetic factors, physiological state of the cuttings and the environment in which cutting is planted.

Sunil Puri (Haryana)



Conservation of Kalakkad reserve

Kalakkad reserve forest is a potential area with extreme biological wealth and deserves *in situ* conservation as a genetic reservoir of wild species. Measures should be taken for possible *ex situ* conservation. The establishment of proposed Agasthyamalai Biosphere Reserve will be helpful for this.

N. Pathasarathy (Pondicherry)

Reforestation - experience from Spiti

The main problems of reforestation in Spiti (a cold desert area) include non-cooperation from the older generation, hostile climate, lack of proper planting stock, limited number of suitable species, poor water holding capacity of the soil, short growing period and other natural hazards.

Rajan Bawa (Himachal Pradesh)

Forest protection becomes difficult

In Kerala, due to population pressure, scarcity of land, possibility of multifarious alternative land uses, scarcity of forest produces and escalating prices, the job of foresters to protect forest is very difficult. Loop-holes in protection laws, scarcity of material and human resources are other problems.

R. R. Shukla (Kerala)

Questions from Engineers

Has the engineers been taught or trained at any level on how the ecology will be affected when a particular type of construction is made? Has the ecologists or environmentalists tried to have friendly interaction with engineers and put forward suggestions to solve the problem created by construction? If not, why blame the engineers for not considering ecosystem conservation?

N. Madhu (Kerala)

Ecosystem conservation in Vietnam

Although many active campaigns are being carried out in Vietnam for ecosystem conservation, the lack of experience on nature and forest conservation, and scarcity of funds are some of the limitations.

Vu-Van-Dung (Vietnam)

Deforestation in North East Thailand

The deforestation was due to a combination of several factors such as the resettlement of the people displaced by dam constructions, the natural population growth, the introduction of cassava and kenaf and the migration from outside due to availability of land.

Niwat Jatikanond (Thailand)

In Nepal

As an integral part of Indo-Ganga-Brahmaputra geoecological horizon Nepal occupies the mid segment of the Himalayas, where more than 80 percent of land mass comprises of rugged hills and mountain terrain. The destructive natural processes have been aggrevated by human activities in this region.

P. Kanwar (Nepal)

In Bhutan

The crucial problem is how to restore the lost soil fertility by natural means, how to speed up the restoration of soil fertility through the course of plant succession, how many decades it would take? Research is needed on these aspects.

T. R. Giri (Bhutan)

Irrigated and rainfed bamboo plantations

A detailed study in Karnataka with *Dendrocalamus strictus* concluded that an estimated demand for 3 lakh bamboos could be met by raising 100 ha of irrigated or 300 ha of rainfed plantations or judicious combinations of both, to sustain about 500 Medar families entirely dependent on bamboo as raw material.

G. V. Sugur (Karnataka)

Role of media in Social forestry

The Press has an effective role in facilitating national development through encouraging or promoting public activities such as social forestry.

Lilibeth-Amatong (Philippines)

Forests and Tribal life

The most important measure to ensure tribal welfare is providing opportunity for literacy and full-time employment. Any activity in the name of a biosphere should begin with genuine understanding of the life styles and problems of the tribal people in the area.

R. Rajaraja Varma (Kerala)

Conservation of tropical rainforests in Sri Lanka

In Sri Lanka nearly 30,000 ha of Tropical rain forests have been identified for conservation of tropical forest ecosystems. A conservation plan for 11,500 ha of Shinharaja national heritage and wilderness area has been prepared and implemented.

S. Sahajananthan (Sri Lanka)

Afforestation in Bangladesh

Village afforestation, road side plantation, agroforestry, coastal afforestation and rubber cultivation in depeleted forest land under intensive management with social motivation are some of the new aproaches found successful for afforestation in Bangladesh.

A. B. M. A. Hussain (Bangladesh)

FIELD VISITS AND EXERCISES

Field visits and exercises were organised to the following places for 5 days.

1 **Sholayar-Vazhachal:** The participants were shown typical evergreen forests, reed regeneration, two species of canes, rosewood augmentation plots, plantations of Albizia, silver oak, teak and rubber.

2 **Iringole:** Visited a sacred grove where an undisturbed patch of about 10 ha. of West Coast tropical Evergreen Forests is maintained.

3 **Attappady:** The trainees were shown afforestation trials, valley cultivation, tribal hamlet evaluation methods and farm lands.

4 **Silent Valley:** The sample plots established by KFRI for longterm monitoring and typical tree species associations were shown to the participants. Field exercises were given for identification of trees using vegetative characters with a key prepared by KFRI. In addition, use of light traps for insects, survey methods for birds, and methods for behavioural observation on lion-tailed macaque were discussed. The participants were also shown evergreen forests, grass lands and wildlife.

TROPICAL FOREST ECOSYSTEM
CONSERVATION AND DEVELOPMENT

RECOMMENDATIONS

The MAB workshop on tropical forest ecosystem, conservation and development organized by the Kerala Forest Research Institute made the following recomendations.

1. To recommend to the Govt. of India to nominate Silent Valley National Park as a World Natural Heritage site.
2. To utilise Biosphere Reserves as centres for public education.
3. To analyse the sacred groves existing in the western Ghats to determine the minimum viable area for effective conservation.
4. To conceptualise each Forest Division as a Biosphere Reserve and delineate specific areas for conservation, restoration and forestry operations.
5. To undertake comparative studies on the structure and species diversity in tropical forests of the South and South-East Asian countries.
6. To study the state of restoration in logged over forests.
7. To promote studies on deciduous forests, an important component of tropical forests.
8. To pay greater attention to sociological aspects for successful development of management strategies for tropical forest ecosystem.
9. To concentrate more efforts on creating sustainable life support systems for tribals and other forest communities.
10. To recommend declaration of Agasthyamala as a Biosphere Reserve.
11. To recommend to UNESCO for organising long term training on quantitative ecological studies, for selectad individuals.
12. To recommend to UNESCO for conducting short term training in management of Biosphere Reserves.
13. To organise the next workshop in a South or South-East Asian country on Buffer zone management in protected areas.

RECOMMENDATIONS OF THE AD-HOC GROUP OF EXPERTS

The recommendations of the ad-hoc group of experts were limited to a small number of priority items in research and training and consisted of the following.

Research Priorities

1. Study of the state of restoration of logged over tropical forests.
2. Development of field keys for tree identification based on vegetative characters.
3. Quantitative studies on ecosystem dynamics of tropical evergreen and tropical deciduous forests.

Training needs

1. The UNESCO may organise short term training courses in management of Biosphere Reserves.
2. The UNESCO may organise, in addition, long term training of selected young scientists on quantitative ecological methods, a field of study in which adequate expertise does not exist at present in most developing countries.

International Standard Book Number

International Standard Book Number (ISBN) is a unique number assigned to every book for its proper identity. ISBN is a 10 digit number constructed in 4 segments

Example : 0-89495-027-4

The first segment (country identifier) denotes the geographical area. The second segment (Publisher identifier) denotes the publisher. The third segment is the serial number for a book in the publisher's register. The fourth segment is called check digit worked out from the first 9 digits.

On the basis of the above explanation the above number can be interpreted as follows:

0 = International
89495 = Institute of Scientific Information (ISI)
027 = 28th publication of ISI (First publication starts with 000)

How the check digit is worked out

Each of the first 9 digits is taken as separate unit and multipiled by 10, 9, 8, 7, 6, 5, 4, 3 and 2 respectively.

i.e.	0 x 10	=	0
	8 x 9	=	72
	9 x 8	=	72
	4 x 7	=	28
	9 x 6	=	54
	5 x 5	=	25
	0 x 4	=	0
	2 x 3	=	6
	7 x 2	=	14
			271

The sum is divided by 11

i.e. 271 ÷ 11

The number required for making the sum completely divisible is taken as the check digit. When 271 was divided by 11, the remainder was 7. If 4 is added to 271 it could be completely divided. Thus 4 is chosen as the check digit. In some cases the number to be added will be 10. In such occasions the check digit in the ISBN is written as 'X' to limit the total digits in the ISBN to ten.

For example: 0-632-01895-X.

ISBN is always written with the ISBN prefix and each segment is separated by a hyphen.

Example: ISBN 0-632-01895-X

In every country there is an agency to assign ISBNs for all publishers in the country. In India, Raja Rammohun Roy Centre, Kasthurba Gandhi Marg, New Delhi-110 001 is the agency entrusted with this responsibility. They assign country identifier and publisher identifier to each publisher. The other numbers are worked out by each publisher.

New Publications

Scientific Papers

Surendran, T.; Seethalakshmi, K. K. and Somen, C. K. 1986. Vegetative propagation of *Bambusa arundinacea* and *Dendrocalamus strictus* by culm cuttings. Malaysian Forester 49 (3): 432-456.

Nair, K. S. S. 1988. Role of host trees in the dynamics of forest insect outbreaks. Phytophaga 2 (2) : 137-141.

Nair, K. S. S. 1988. Pest management in Indian forestry : How to bridge the gap between theory and practice. In : Mohandas and George Koshy Eds. Integrated Pest Control, Progress and Perspectives pp. 32-35.

Varma R. V.; Ali, M. I. M. and Sudheendrakumar, V. V. 1988. Comparative pathogenicity of some *Bacillus thuringiensis* strains on larvae of *Eligma narcissus*, a major pest of *Ailanthus triphysa*. In : Mohandas and George Koshy Eds. Integrated Pest Control, Progress and Perspectives. pp. 264-266.

Gnanaharan, R. ; Dhamodaran, T. K. and Thulasidas P. K. 1988. Yield and quality of charcoal from coconut stem wood. Biomass 16 : 251-256.

Renuka, C. and Seethalakshmi, K. K. 1988. Phenology and propagation of Calamus - their bearing on practical application. In : G. Dhanarajan and N. Manokaran (Eds) RIC Occasional paper No. 5. Rattan Information Centre, Malaysia. pp, 1-5.

Indira, E. P. 1988. Albino gene carriers and mating system in *Bambusa arundinacea* (Retz) Willd. (Short Note) Silvae Genetica 37 : 249-250.

Bhat K. M.; Bhat, K. V. and Dhamodaran, T. K. 1989. Radial patterns of density variation in eleven tropical Indian hardwoods. Holzforschung 43 : 45-48.

Bhat, K. M.; Bhat, K. V. and Dhamodaran T. K. 1989. Fibre length variation in stem and branches of eleven tropical hardwoods. IAWA Bulletin N. S. 10 : 63-70.

Bhat, K. M.; Renuka C.; Seethalakshmi, K. K.; Muraleedharan, P. K. and Mohanan, C. 1989. Management and utilisation of rattan resources in India. In : A. N. Rao and I. Vongkalung (Eds). Recent Research in Rattans. Kasetsart University and International Development Research Centre, Canada. pp 35-45.

Dhamodaran, T. K.; Gnanaharan, R. and Thulasidas, P. K. 1989. Calorific value variation in coconut stem wood. Wood Science and Technology 23 : 21-26.

Somen, C. K and Seethalakshmi, K. K 1989. Effect of different storage conditions on the viability of seeds of *Bambusa arundinacea*. Seed Science and Technology, 17, 355 - 360.

Abstracts of Research Reports

Balasundaran, M and Mohamed Ali M. I. 1989. Control of Teak mistletoe through trunk injection of chemicals, KFRI Research Report No. 59. Final report of Project Pathol NF. 05/84.

Dendrophthoe falcata var. *pubescens* Hook. f., the phanerogamic parasite attacking teak causes considerable damage to teak plantations. Infusion of selective weedicides into the trunk of parasite infected trees has been recognised as a new strategy for the control of mistletoes without harming the host.

Aqueous solutions (100 ml,300 ml and 500 ml) containing, 10,25,50 and 100 mg a.i./litre of herbicide metribuzin (Sencor 70) were infused into 17 year old teak trees infected with the mistletoe through tree

infusion technique. Though all the concentrations were capable of killing the parasite, 25 and 50 mg a.i/l solutions were found to be more suitable for pilot scale experiments. Solutions of 100 mg a.i./l concentration showed harmful effects on host trees. Differential tolerence of the toxic effect of the herbicide residues was shown by some trees treated with lower concentrations also. Reinfection of the host, which had been treated successfully with the herbicide, within three years showed that there was no retention of the chemical to inhibit reinfection of the host. Atrazine and simazine did not cause any damage to the parasite when infused with 300 ml solution of 200 mg a.i /l strength. But glyphosphate has shown encouraging results with 100 ml and 300 ml solutions of the above concentration.

Addition of two adjuvants, Ethokem and Ethomeen HT/60, supposed to give faster uptake and translocation of herbicides has not given any improvement in the performance of the herbicides against the mistletoes.

Muraleedharan, P. K and Bhat, K. M, 1989. A Techno - economic study of saw milling industry in Kerala. KFRI Research Report No. 60. Final report of Project Econ. 06/85.

Sawmilling is a primary wood processing industry before wood is put into use in different solid wood products. An attempt is made in this study to examine the economic and technological aspects of the sawmilling industry in Kerala, in the context of declining raw material supply. The study is based on primary data collected from a sample of 165 sawmills, randomly selected from eight districts in the state.

Sawmilling in Kerala is very individualistic industry, made up of enterprising individuals. In the early years, most of the sawmills were under proprietorship. However, with the increase of capital requirements, this has been replaced with partnership form of ownership in majority of the sawmills in the state.

A typical sawmill in Kerala has a vertical or horizontal band headrig, circular or band resaw, occasionally a trimmer/crosscut saw and a grinder. The number of these machines may be more than one in medium-size sawmills while small units may function even with single resaw. Most of the units have Indian made machineries with technical specifications of Belgium machines. The major limiting factors identified in lumber recovery are: log degradation (due to biological organisms and physical agents), availability of relatively small diameter logs, inproper selection of tools and equipment and sawing patterns.

Productive capital consists of fixed capital and working capital and the latter constitutes about 72% of the productive capital. Stock of raw material is the major component of the working capital, accounting for 66%. There exists a positive relationship between size and different types of capital and the same relationship is observed between size income and profit.

House compounds and import are two major sources of supply of timber. Because of the shortage of raw material, the capacity utilisation is of the order of 53%. As size increases the capacity utilisation also increases, since large size mills have better stock of raw material. The average outturn in a sawmill accounts for only 50%. In the context of continuous shortage of raw material, higher rate of outturn is imperative for augmenting the supply of sawn wood. This could be achieved in two ways ; 1. modernisation of the sawmill and 2. protecting the logs from cracking, end splitting and biological degradation. The existing system of custom sawing is one of the constraints for the improvement of log storage technology as sawmill owner passes the loss arising out of improper storage to the customer. The necessary finance for modernisation may be mobilised either by ploughing back a part of the profit to the industry or by changing the ownership pattern. With a view to increasing the capacity utilisation and minimising the waste, integration of sawmill with other allied activities such as furniture making, joinery, etc. must be strengthened. However, formulation and effective implementation of long term forestry strategy for augmenting the supply of timber are essential to ease the raw material situation in the industry.

Chacko K. C, Sankar S, Pandalai R. C, Nandakumar, U. N. 1989. Studies on the effect of slash burning on planting site for teak. KFRI Research Report No. 61. Final Report of Project Silvi. 05/81.

An extensive field trial was conducted at Mundakadavu of Karulai range in Nilambur Forest Division during 1981-85 to study the effect of slash burning on soil properties, weed growth, taungya yield and growth of teak (*Tectona grandis* L. f.) in a second rotation plantation. The study lead to the following conclusions. Burning caused significant enhancement of base content and change in soil reaction from acidic to alkaline.

These effects were short lived and within six months the soil had the same reaction and base content as at the start of the experiment, Though burning reduced weed growth during the first three months after planting, the difference was not significant subsequently. The yield of paddy (*Orysa sativa* L.), the first taungya crop was not influenced by the treatments. None of the treatments had significant influence on survival of teak. The treatment effect on height of teak, though noticed during the first three years was not significant afterwards. Savaging firewood between 10-30 cm girth over bark (which would have otherwise been burned) yielded a net revenue of Rs. 756 per hectare in 1982 after meeting the labour charges of Rs. 1244. As slash burning did not have lasting influence either on the growth of teak or on soil properties, a modification in the current practice is suggested. All wood down to 10 cm girth over bark - the lower limit up to which firewood collection may be commercially viable - could be marked and the rest either burned (resulting in a light slash burning) or left at site (to deteriorate over time) depending on local conditions.

ISSN For KFRI Research Reports

KFRI Research Reports fall under the category of serials published at irregular intervals. Recently the research reports have been alloted with ISSN (International Standard Serial Number). The ISSN for KFRI Research Reports is 0970 - 8103.

New Research Projects

The following new Research Projects were initiated during 1989.

KFRI 122/1989. Growth response of seedlings of selected indigenous species to NPK inputs

Investigators : T. G. Alexander and M. P. Sujatha, Division of Soil Science

Objectives : The project envisages to study the effect of NPK alone and in combination on growth of seedlings of seven selected indigenous species both in pots as well as in field trials. The results will be useful in suggesting doses of NPK for enhancement of growth during and after establishment phase.

KFRI 123/1989. Upgradation of Rubber wood

Investigator : T. K. Dhamodaran and R. Gnanaharan, Division of Wood Science

Objectives : The main objective of the project is to increase the durability of rubber wood, for which suitable diffusion and pressure treatments using boron chemicals will be developed.

KFRI 124/1989. Species trials for reforestation of Pattikkad Hill

Investigator : N. Gopalakrishnan Nair, Division of Botany

Objectives : When this project is completed, it is expected that a barren hill at Pattikkad will be reforested. Apart from this problems encountered in such restoration works can be identified and the remedial measures can be found out.
This project is sponsored by Social Forestry wing of Kerala Forest Department.

KFRI 125/1989. Water blisters in Teak

Investigators : Jose Kallarackal and K. V. Bhat
K. K. Seethalakshmi Division of Wood Science
Division of Plant Physiology

Objectives : The main objectives are to study the causes of water blister formation in teak and nature and type of damage caused to the timber. With this information it may be possible to find out some practical solutions to reduce the problem.

KFRI 126/1989. Litter dynamics, microbial associations and soil studies in *Acacia auriculiformis* Plantations in Kerala

Investigators : K. V. Sankaran, M. Balasundaran, Division of Plant Pathology; and Thomas P. Thomas, M. P. Sujatha, Division of Soil Science

Objectives : The project is expected to provide detailed information on (1) Litterfall and decomposition (2) Nutrient status of *Acacia* leaf litter, (3) Characteristics of soils under Acacia plantations and (4) Status of mycorrhizal and rhizobial associations and their significance in the growth of *A. auriculiformis*.

Social Forestry wing of Kerala Forest Department is financing this project.

Seminars, Symposia and Workshops

Dr. R. Gnanaharan, (Wood Science) participated in the Palmwood utilization (Asia) Meeting held at Los Banos, Philippines during 22-26 January 1989 as a project evaluator.

Dr. K. M. Bhat, (Wood Science) was deputed to the Institute of Wood Biology Hamburg, Federal Republic of Germany under the sponsorship of International Development Research Centre, Canada for a research cum training programme in rattan anatomy during April-July 1989.

Shri. M. Balagopalan, (Soil Science) participated in the Regional Symposium on Recent Development in Tree plantation of Humid, Sub Humid Regions of Asia held at Malaysia from 5 to 9 June and presented a paper entitled "Properties of soils in *Albizia falcataria* plantations in Kerala.

Dr. K. Balasubramanyan, (Ecology) participated in the National Seminar on Natural Resources Conservation and Environmental Management from 5 to 7 March 1989 at Kanpur and presented a paper "Impact of selection systems".

Smt. N. Sarojam, Library Assistant attended the 23rd annual seminar of the Documentation Research and Training Centre, Bangalore from 6 to 9 March 1989 and presented a paper entitled 'Forest Entomology Literature in India : A bibliometric study.

Shri. M. Balasundaran, (Plant Pathology) participated in the group discussion on root (wilt) disease of coconut and yellow leaf disease of arecanut held at CPCRI Regional Station, Kayamkulam from 5 to 7 March 1989.

Dr. C. Renuka, (Botany) attended the National Symposium on Environmental Assessment and its Management through Social Forestry in Tribal regions, held at Birsa Agricultural University, Ranchi, from 4 to 6 April 1989 and presented a paper entitled "Rattan plantation - its potential and prospects in social forestry".

Shri. C. Mohanan, (Plant Pathology) attended the National Conference of the Indian association of Mycoplasmology and the Workshop on Isolation, Identification of Mycoplasma from animals, plants and men held at Mathura and All India Institute of Medical Science, New Delhi during 6-9 April 1989.

Dr. V. V. Sudheendrakumar (Entomology) and **Dr. N. G. Nair** (Botany) attended the 3rd Forestry Congress at Dehra Dun from 29th May to 1st June 1989. The following papers were presented by them. 1. Reproductive behaviour of the teak defoliator, *Hyblea puera* and its application in the pest management. (V. V. Sudheendrakumar) 2. Mixed plantations and their role in conservation of indigenous trees in Kerala. (N. G. Nair)

Dr. K. Swarupanandan (Ecology) and **Shri. N. Sasidharan** (Botany) participated in the short course on Indigenous Instrumentation for Agroclimatological Investigations held at Central Institute of Fisheries Technology, Cochin during 6-14 June 1989.

Dr J K Sharma (Plant Pathology) and **Dr.R.V. Varma** (Entomology) participated in the seminar on Forest Protection held at Forest Research Institute, Dehra Dun from 29 to 30 June 1989 and presented the following papers. 1. "Current status of disease in forest nurseries and their management". (Dr. J. K. Sharma) 2. Predatory potential of the reduviid bug *Panthous bimaculatus* against major pests of *Ailanthus triphysa* (R. V. Varma) 3. Implementation and injection of some systemic insecticides for the control of teak carpenterworm *Cossus cadambae* Moore (George Mathew, presented by Dr. R. V. Varma)

Shri. K. Shankara Pillai, Assistant Librarian attended a four week training course on 'Computer Application to Library and Information Activities' organised by Indian National Scientific Documentation Centre (NSDOC) from 26th June to 21st July 1989 at New Delhi.

Dr. K. V. Sankaran (Plant Pathology) has undergone a training on "Recent techniques in mycorrizal research" at Department of Agricultural Microbiology, University of Agricultural Sciences. Bangalore during July 17-21. 1989.

Dr. K. S S Nair (Director-in-charge) **Dr. J. K. Sharma** (Plant Pathology), **Dr. K. K. Seethalakshmi, Shri. T. Surendran** and **Shri. C. K. Somen** (Plant Physiology) attended the seminar on Vegetative Propagation of species of Forestry importance, organised by Institute of Forest Genetics and Tree breeding at Coimbatore from 27 to 28 July 1989 and presented the following papers.

1. Vegetative propagation of bamboos using growth regulating substances (T Surendran, K. K. Seethalakshmi, and C. K. Somen)
2. Vegetative propagation of some important tree species by rooting cuttings (K. K. Seethalakshmi, T. Surendran and C K. Somen).

Shri. Mammen Chundamannil (Economics) and **Dr. R. C. Pandalai** (Silviculture) attended a Seminar on 'Towards the 21st Century' at the Institute of Management, Trivandrum from 22 to 24 August 1989.

Shri. P. S. Easa (Wildlife Biology) participated in the Nature Camp at Periyar Tiger Reserve as a resource person on 26 August 1989 and gave a talk on Importance of Wildlife Conservation and the role of Voluntary Organisations.

Dr. P Vijayakumaran Nair (Wildlife Biology) attended the Refresher course for Biologists at the Madurai Kamraj University from 18 to 19 September 1989 as a resource person and gave lectures on "Clustering" and "sequence analysis".

Campus News

Shri C D. Johny, who was on deputation as Deputy Registrar (Administration) left the Institute on 26 June 1989 to join the Medical College, Trichur as Administrative Officer.

Sri. P. V. Madhusoodanan, Range Officer, Social Forestry Unit joined the Institute on deputation with effect from 12 July 1989. He presently works at the KFRI Subcentre, Nilambur.

Shri Joseph K. John, Deputy Secretary to Government of Kerala joined the Institute on deputation and took charge as Registrar with effect from 27 September 1989.

Visitors

1. Mr. S. Shigesawa
   Advisor to the President
   Japan Overseas Forestry
   Consultants — 14-16 March 1989
2. Dr. E. J. Gibson
   Emeritus Professor
   University College of
   North Wales — 12-15 April 1989

KFRI Seminars

1. Chemical immobilisation of Animals
   Prof. Jacob V. Cheeran
   Department of Pharmacology,
   College of Veterinary & Animal Sciences
   Mannuthy, Trichur — 29 July, 1989
2. Forestry problems in Nicaragua
   Dr. Falguni Guharay
   Advisor to Ministry of
   Agriculture and Forestry,
   Nicaragua — 11 August, 1989
3. Wood Research in West Germany
   Dr. K. M. Bhat
   Division of Wood Science,
   Kerala Forest Research Institute,
   Peechi — 7 September, 1989