DEFORESTATION IN KERALA : CAUSES AND CONSEQUENCES.

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CERTIFICATE

I hereby affirm that the research for this dissertation title "Deforestation in Kerala: Causes and Consequences" being submitted to the Jawaharlal Nehru University for the award of the Degree of Master of Philosophy was carried out entirely by me at the Centre for Development Studies, Trivandrum.

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Certified that this dissertation is a bonafide work of Sri Suresh Chand Joshi and has not been considered for the award of any other degree by any other University. The dissertation may be forwarded for evaluation.

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Chapter 1

INTRODUCTION

The last few decades witnessed a rapid rate of deforestation in India.[1/] During the period from 1951 to 1979, it is estimated that about 4.5 million hectares of land were deforested for the nonforestry purposes in the country.[2/] Estimates have shown that the annual rate of deforestation was about 0.15 million hectares during 1950 to 1970 and it may have increased to about 1 million hectares since the latter part of the seventies.

In the absence of reliable data, the impact of deforestation on the forest cover is difficult to estimate. There is also significant divergence between the official and other independent sources of estimates of the extent of forest cover in the country. According to some independent estimates the total forest area is only about 12 per cent of the geographical area whereas the official estimates is about 23 per cent.[3/] Even if we accept the official figures with all its limitations it can be observed that in terms of per capita forest, India ranks among the lowest in the world, yet the per capita forest area has been reducing — from 0.16 ha in 1960-61 it has reduced to 0.14 ha in 1970-71 and 0.13 ha in 1980-81.[4/]

The sharp reduction in forest area is generally attributed to the low land man ratio, increasing population growth and the consequent increase in demand for agricultural land, fuelwood, fodder and timber. This in turn led to encroachment of forest land and illegal fellings in forest areas. Apart from this, the various developmental programmes (like river valley projects, roads and transmission lines, industrial and other developmental projects) started by Central and State Governments have also caused a great extent of deforestation.

There have been a number of attempts in the recent times to examine the causal factors underlying deforestation and its consequences. Most of these studies had examined the current forest policy (i.e. the National Forest Policy of 1952 henceforth, NFP) and traced its evolution to the colonial forest policy of British India and argued that several of the current day forestry problems have their genesis in the colonial policy.

For example, R. Guha, [5] maintained that the large scale deforestation and all the consequent harmful effects due to it as well as the sufferings and wants faced by rural poor or "forest communities" are the result of historical process of development of colonial forest policy and its continuation as NFP during the post Independence period. Gopa, Joshi [6] taking the similar historical reasoning argued that tribals, who before the advent of British were the virtual owners of the forest lands wherever they inhabited, were turned into poorest of poor beings in the land and were put at the mercy of lower level functionaries of forest department.

Madhav, Gadgil, et.al. [7] pointed out that due to lack of scientific forestry tradition in their own country, the Britishers not only depleted the large chunk of forest cover in India but also directed the forestry practices for the benefit of few individuals belonging to ruling classes like traders, forest contractors, rich farmers etc. They further argued that by following blindly the colonial forest policy, the NFP was also favouring only the current ruling section of society like industrialist, commercial houses, contractors. Madhav, Gadgil [8] argued elsewhere that the so called currently ongoing scientific forestry management practices by various forest departments is a misnomer.

These management practices which have their origin in Colonial forestry management practices, are not based upon true scientific principles as they lack many basic information (like lack of basic factual information about structure

and composition of forests and the requirement of needful users of forests — rural and poor people). As a result, a large number of vegetation type and forest tree species have decimated since the colonial times. Therefore, in order to save the remaining diversity in vegetation type and tree species as well as control the forest cover loss, a time has come when not only the exploitation of forests for urban industrial sector alone to be checked and prudently managed but even the manner of utilisation by the poor also to be regulated and properly directed.

Pradeep, Prabhu[9] argued that the Indian forests were considered as vast reservoirs of a "dead produce - wood" by the Britishers and therefore were utilized for "filling their burgeoning coffers", by cutting them wantonly This resulted in causing alienation and misery of the tribals and rural poor who depended on forests for centuries. Likewise (Vohra, B.B., Agarwal Anil et.al.)[10] have examined the harmful consequences of deforestation in post Independent India, for example, landslides, soil erosion, silting up of dams etc.; Arun, Sinha[11] analyses the problems of Tendu leaf workers; S.W. Muranjan.[12] looked into the dynamics behind poor condition of tribal forest cooperatives workers, and related it directly and indirectly to the colonial forest policy.

The argument put forth by Guha, Shiva, Sharatchandra and Bandyopadhyay, Kulkarni[13] was that the roots of many forestry problems existing today especially deforestation was the historical process of reservation of forests and their virtual plunder by the colonial rulers, for their vested interest. They argued that in the process of doing so the tribals and other poor people (local communities), who were communally owning the forests prior to British advent have been slowly excluded from the use and management of these resources. Due to this exclusion and consequent hardships, the local communities also lost interest and

faith in utilising the forests harmoniously and started cutting rapidly the village and panchayti forests available for their use. Thus these authors recommend to change the current NFP and forestry practices and urged for formulating such policies which could involve local communities by winning their confidence and faith in forest practices.

The above studies suffers from the following limitations. Although the premise of these studies that current NFP is nothing but a continuation of colonial policy and has been largely responsible for deforestation and other harmful consequences of forestry sector is reasonable, the coverage of these studies and their approach is inadequate to capture the regional variations in the forest types and the socio-economic factors which governs its utilisation.

The inadequate coverage of these studies arises from the fact that these studies concentrated their attention mostly to the important forest types in British India and have largely overlooked the forest types in other parts of India. Since the impact of deforestation is likely to be different in different types of forests it is important to understand the ecological specificities of each type of forest.

In India as many as 16 major types of forests are found in different types of climatic and topographical conditions.[14/] Each forest type is a distinct ecological formation governed by several factors and is a highly complex and dynamic biological system in itself.[15/] Based on their specificity there are structural and functional differences among different forest types.

For example, the monospecies forests of temperate parts of India like pine forests of Himalayas are simpler in structure and largely useful for providing direct benefits to society (like timber, fuelwood, small timber,

fodder etc.), while the Tropical Evergreen and Semi Evergreen found in Western Coast are comparatively more complex in structure and largely useful in providing indirect benefits (like prevention of soil erosion, reduction in run off of rain water, maintaining stream flow etc.)[16/]

The approach adopted in most of the studies was to analyse the process of deforestation through the impact of the development of forest land use policies and practices. Such an approach did not take into consideration the impact of historical changes in social, economic and political conditions of the region in general and changes in non forest land use in particular. In this context it may be noted that the difference in the development of forest as well as non forest land use pattern of different regions would be largely explained by the differences in social, economic and political conditions of those regions.

During pre-Independence days there were large differences in these conditions of different regions of India. These differences were largely due to existence of different type of political set up — a large part of India was under colonial rule , while many other States were under local Rajahs/Chieftains. These differences in political conditions were reflected in the type of policies made and programmes implemented to utilize forest as well as non forest land resources. For instance, the main objectives of colonial government behind managing its forest and non forest land was to either enhance the revenue of the British exchequer or utilize them for serving the cause of colonial rulers and not the benefit of society at large.

On the other hand in most of the native States the objectives and programmes were in general based on the priorities of the local government. Due to this variation in the historical development of the type of policies made and programme

implemented to utilize land resources in British Indian districts and other native States, the forest resources of different region must have developed differently in pre-Independence India. Since such differential developments in the forestry sector of various regions were not examined in the earlier studies, the region specific factors shaping deforestation and its consequences did not surface in such studies.

Most of such studies have provided only insights into the existence of certain common factors (like colonial interests of developing railway, fulfilling demands of timber of British Army and Navy, two World Wars and commerical interest of traders, industrialist and government in the post Independent India) as responsible for deforestation and for a particular pattern of forestry development. Likewise these studies also point out the illeffects of deforestation in general terms viz. soil erosion, increased runoff, shortage of fuelwood, fodder and small timber, alienation of tribals and rural poor from the forest lands and produce, development of unhealthy relation between forest dwellers and forest officials etc.

Thus we have argued in the foregoing discussion that the current debate on deforestation and its consequences is partial and does not take into account the specificities of various forest types and socio economic conditions (hereafter regional specificities) that have shaped its utilization. Because of this lacuna, these studies have only limited practical use for suggesting effective policy interventions to arresting the ongoing process of deforestation or for designing appropriate policies and programmes for the optimum utilisation of forest resources of various region in the country.

What is needed in this context are systematic and indepth studies on the historical development of forest resource utilization and socio economic factors

shaping it for specific regions. The present study is an attempt in this direction. For the purpose of the present study we have chosen the state of Kerala. An important reason for selecting this State is that the major causes of deforestation in large parts of this State were different from the earstwhile British Indian districts. Moreover by taking the case of Kerala we shall be able to study the historical reasons for deforestation in an earstwhile princely state of Travancore (which was one of the three constituents of present state of Kerala) for the pre-Independence period.

There are two important reasons for considering Travancore as the study area for pre-Independence period. (i) Travancore had its own independent policy and distinctive forest types which makes it quite different from most of the British Indian districts. Therefore Travancore is an ideal region to show the impact of different regional specificities on the type of forests which are largely different from British Indian types, to fulfill the gap in the existing debate (ii) since our study requires use of historical material, the comparatively easy availability of historical documents regarding various aspects of Travancore economy and forests, weighed in favour of considering Travancore.

The objective of this study is to examine the causes and consequences of deforestation in Kerala. In the process we will also study the interaction between the "forestry sector" and the "non forestry" sector, which in our understanding is crucial to the evolution and continuation of the process of deforestation.

The approach to the study has been governed by our understanding of deforestation - not a static (self perpetuating) condition but a dynamic process. Accordingly, the study is conducted within a historical frame-work. Such an approach to the study will help us to understand not only the nature and pattern of deforestation but also its genesis.

The study begins by analysing the broader socio-economic sphere within which the forestry sector functions, and the changes therein. The developments within the forestry sector with reference to deforestation are then attempted to be understood and explained in the light of these changes; in addition to those (changes) within the forestry sector itself.

Throughout the study this duality will be maintained. Within this duality, the objective is to relate the developments in the broader socio economic sphere with those in the forestry sector and explain deforestation as a (natural) outcome of this interaction. It is sought to demonstrate how various developments within the forestry sector, including forest policy, are largely conditioned by factors outside the forestry sector. This holistic orientation is the point of departure of this study from the earlier ones.

The rest of this study is organised along the following lines. Chapter 2 documents various changes that took place in the economy, including forestry sector, of Travancore during the period 1820-1890. The main thrust of the Chapter is to analyse the historical emergence of currently existing forest and non forest land use practices and how they conditioned the existing forests of Travancore in the absence of an explicit forest policy. Chapter 3, traces the evolution and development of forest policy in Travancore during 1890-1947. Various factors that shaped the implementation of the forest policy and its consequent effect on the forest and forestry practices are discussed.

Chapter 4, is an extension of Chapter 3 in that it discusses further growth in non forestry land use practices and other socio economic factors on

the forest cover of Travancore. Chapter 5 takes up the post Indpendence Travancore i.e. the State of Kerala to capture the impact of state sponsored developmental schemes, and traces their non forestry land use practices with particular references to the extent and impact of encroachment on the forest cover of Kerala. Chapter 6 studies the same period with a view to analyse the role of NFP and traditional forestry schemes in further shaping of forest land use practices and its role in the development of current forestry problems and deforesting effect on the forest cover of Kerala.

Chapter 7 concludes the study and draws on some policy implications.

Notes and References

1. In the last few decades especially after 1970 several authors have written on the subject of deforestation, rate of deforestation and its consequences. See for example, Eckhohm, Erik(1979); Allen, J.C. and Barnes, D.F.(1985); Revelle, R(1980); FAO(1981);Gleisinger, E(1960)

2. Government of India, (1984); p.15 and Gadgil, Madhav., Narendra Prasad, S., Ali Rauf (1983) in Fernandes Walters(Ed).; p.30 Saldanha, Cecil J. (1983) in Fernandes, Walters (Ed) p.45.

3. See, The State of India's Environment A Citizens' Report (1982); Futehally Zafar (1985); Vohra, B.B.(1981); Baig, Murad Ali(1982) in Gadgil, Madhav et.al.

4. Government of India;(1984), Op.cit.; p.12

5. Refer Guha, R.(1983)

6. Joshi, Gopa.(1983) in Fernandes, Walter and Kulkarni, Sharad (Ed) Op.cit.

7. Gadgil, Madhav., Prasad, S. Narendra and Ali, Rauf.(1983) Op.cit; p.14

8. Gadgil, Madhav,(1983)in Fernandes, Walters and Kulkarni Sharad (Ed) Op.cit.

9. Prabhu, Pradeep (1983)in Fernandes, Walters and Kulkarni, Sharad (Ed) Op.cit., p.135

10. Vohra, B.B.(1981) and The State of India's Environment - A Citizens' Report (Agarwal Anil et.al. compiled),(1982) Op.cit.

11. Sinha, Arun (1978)

12. Muranjan, S.W.(1980)

13. (a) Guha, R.(1983) Op.cit.

    (b) Shiva, Vandana., Sharatchandra, H.C., Bandyopadhyay, J.(1983) in Fernandes Walter and Sharad Kulkarni(ed) Op.cit.

    (c) Kulkarni, Sharad (1983) Ibid.

14. They range from Coastal Mangroves mainly found in Eastern India belt to Alpine type noticed on the Himalayan ranges at the height of 12,000 feet or above. From Wet Tropical Evergreen Forests or Tropical Moist Forests (TMFS) mainly seen in Assam, Mizoram and other North Eastern States forests, Andamans and North and South Canara belt of forests on the Western Ghats belonging to part of Karnataka, Tamil Nadu and most of Kerala to Dry Thorn Forests found in desert conditions. See Champion, H.G. and Seth, S.K.(1968)

15. Forests are not static but one of the most dynamic and complex system. Due to this reason each forest type when left undisturbed is dynamically transformed from a lower evolutionary stage to a higher stage (this process is technically called Succession) with accompanying changes in its composition and extent of interaction with the surrounding. Also see Pimental, D(1966); Boreman, F.H.and Likens, G.E.(1979)

16. See Appendix 1 for details.

Chapter 2

ECONOMY OF TRAVANCORE (1820-1890)

This Chapter examines the changes in the economy of Travancore during the nineteenth century. This period was characterised by growth of plantation crops in the forested high-lands, changes in the administrative set up for the management of forest resources and the development of the market for timber. The analysis of this chapter is divided into three sections. Section 1 examines the process of displacement of forested land by plantation crops. Section II analyses the changes in the management of forest resources including the development of the market for timber. The impact of these changes on forest cover is examined in Section III.

I

Growth of Plantation Crops

Travancore which was located at the South western extremity of the Indian Peninsula and lies between the Arabian Sea and the Western Ghats had an area of 7625 square miles. The State had three natural division of low mid and highlands. Except for the low land division (which was a coastal tract of flat alluvial and sandy soil) of 1371 square miles, Travancore had hills and hillocks of varying sizes throughout mid and highlands in the remaining 6254 square miles of area.[1/]

Most of the population was concentrated around a narrow coastal belt at the geographically western end of the state.[2] The district in Eastern division and hilly regions were forested and uninhabited and were therefore considered as waste lands.[3] However, during the subsequent decades of 19th century there occurred large scale migration of population from the coastal regions to the eastern division and hilly areas. Such a process was largely an outcome of the interaction among the following factors:

Changes in land Policies

By 1850's in Travancore about 80 per cent of the cultivated land and the whole of the wasteland was owned by Sirkar. The remaining 20 per cent of the total cultivated land was owned by a small number of Jenmies.[4] A complex system of land tenure existed between the tenant ryots and the owners, especially between the tenant ryots and Sirkar lands.[5] The tenants of both these lands had no ownership rights nor did they have the power to transfer the occupancy rights. Most of the tenants were living under the fear of eviction. The tenants of Jenmom lands were frequently harassed by the land lords.[6] Apart from such tenurial relation there existed disparities in the assessment of land tax.[7] Under such circumstances the Government of Travancore announced a series of royal proclamation in the early 1860's[8] mainly to (1) remove the inequalities in the land taxes on different tenurial categories and (2) to ensure security in the minds of tenants and thereby attracting them to bring hitherto uncultivated lands and forested waste lands under cultivation.

As a result of these proclamations the state and Jenmi landlordism ended and the land assumed the character of a commodity in the market.[9] This meant that the land became a freely transferable commodity and consequently, the land

market developed. "Sales are now freely effected between ryot and ryot. Those made in the course of the year so far known to the Sirkar, represented the value of about 4,75,000 Rupees".[10] However, the development of the land market did not result in expansion of cultivation from the coastal areas towards the hitherto uncultivated lands on the Eastern divisions and the forested hills. This was primarily due to fear of disease, wildlife and inhospitable conditions on them.[11] Therefore in order to utilise uncultivated land for agricultural purposes, the Government of Travancore encouraged foreign planters to settle on the forested highlands. This process of settling of foreigners on the highlands also meant for the Government of Travancore the coming of foreign capital in the State.[12]

The state provided the foreign planters a number of concessions including the free gift of certain acres of waste land for a generation or more, facilities to construct houses for the planters and fixing a low rate of rent for land granted on leases.[13] This resulted in rapid increase in area under coffee and tea plantations. Starting from few acres in 1864-65 the area under coffee plantations increased to approximately 40,000 acres by 1874. Similarly from a few acres in 1876-77 the area under tea became 3000 acres by 1890.[14]

These plantations became for the natives models of profitable ventures which could be undertaken on the hills.[15] More importantly, with the growth of these plantations certain type of job opportunities on the estates were generated. The utilization of these opportunities by the natives was further facilitated by the socio economic developments in the plains especially that of roads, and improvement in the social and economic conditions of the Syrian Christian and Izhavas's.

Development of roads:

For transportation of workers, foodgrains and other materials from plains to forested hills where plantations were coming up and the produce of the plantations (like Tea, Coffee) to the marketing centres, roads, especially roads connecting hinterland with the plantations, were very essential. But till the middle of 19th century the state of Travancore had very little roads.[16/]

Since encouraging plantation crops on the forested hills was government's own deliberate policy the Government of Travancore started making efforts to construct roads through its Department of Engineers. Later, a Public Works Department (PWD) which was started in 1860, took over the works of construction and maintenance of roads.

But due to rapidly increasing area under plantation during early 1860's the organisation of PWD was found to be inadequate in the first few years.[17/] Consequently from 1863 onwards the government began to spend an annual guaranteed amount on construction and maintenance of roads.[18/] Subsequently total length of roads started increasing in Travancore (See Table 1)

Table 1: Expenditure on Public Works and Total Road Length (1863-84)

Year	Total Amount spent by Public Works Department (in Rs. lakhs)	Total Length of roads in miles
1863-64	2.00	Negligible
1865-66	4.25	195
1868-69	4.50	266
1883-84	9.35	1100

Source: Annual Administrative Reports of Travancore, Op.cit. various issues

Moreover as is evident from Table 2,a comparatively larger mileage of the roads was constructed on the ghats.

Table-2: Length of Roads in Hilly and Plain Division in 1883-84

Sl. No.	Name of the Division	Nature of the Division	Length of Roads (in miles)		
			Total	In Hilly Division (Sum of Sl.No. 1+2)	In Plain Division (Sum of Sl.No.3 +4)
1	Northern or Kottayam	Hilly	269	606	494
2	Quilon	Hilly	337		
3	Trivandrum	Plain	282		
4	Southern	Plain	212		

Source: Annual Administrative Reports of Travancore, Op.cit., 1883-84; p.7.

The expansion of road network contributed in (i) creating employment opportunities for the natives as labourers. (ii) providing scope for the natives to take up contracts for road and bridge construction or maintenance from PWD and (iii) facilitated faster migration of population from the plains to the hills. The changes in the social and economic conditions of Syrian Christians and Izhava's quickened the process of such migration

Improvement in Social and Economic conditions of Syrian Christians and Izhavas:

In Travancore, the social status was judged by the extent of land held. And apart from the State, during the early part of the 19th century[19] it was the higher caste Hindus who owned most of the land. Therefore, till the middle of

19th century the other communities like Syrian Christians and Izhavas which did not own lands were lower in the social hiearchy. The Syrian Christians were either tenant ryots or engaged in business and most of the Izhavas were slaves and worked as bonded labour on fields or in their traditional occupation of toddy tapping.[20]

By around 1880's the economic conditions of both these communities (especially that of the Syrian Christian) began to improve. Due to the activities of the Christian Missionary Societies (CMS) education began to spread among the Syrian Christians in the post 1850 period. However, this did not help them to find employment in Sirkar service initially. But with the help of CMS connections, large number of them began to leave their traditional parental homes in the plains for settling on the forested hills to secure jobs in the coffee estates and export-merchants offices.[21]

Since the PWD was active in constructing roads some of the Syrian Christians took up the contracts for the same. Later after the completion of Kottayam-Madura road in 1876, large tracts of sloping forested lands were opened up for growing plantation crops in the forested hilly areas. Since Syrian Christians were concentrated around Kottayam and had developed sufficient skills and expertise in the development and maintenance of plantation crops, some of them took the lead among the natives in acquiring tracts of waste land for the cultivation of plantation crops.[22]

Till 1855 Izhavas were subjected to bonded labour by higher caste Hindus and were not given prevailing rates of wages and largely discriminated in other spheres of social life.[23] In 1855 slavery was abolished in Travancore. Consequently the Izhavas began to obtain freedom from bondage and economic

exploitation. This process was helped by diffusion of education among Izhavas, through Christian Missionaries. The spread of education made the Izhavas conscious of their rights and they started demanding the prevalent rates of wages.

Further many Izhavas began to leave old landlords in search of new places of work where the due wages were given or jobs with better wages. With the availability of jobs in plantations and at road construction sites, a large number of Izhavas procured these jobs at higher wages.[24] Obviously in this process of acquiring new jobs many Izhavas began to leave their traditional occupation of toddy tapping and started moving towards the hilly areas where road works were on and plantations were coming up.

Growth of population in forested hilly areas and Eastern divisions:

The development of ghat roads and improved social and economic status of Syrian Christians and Izhavas resulted in the large scale migration of these communities from plains to the forested highlands.[25] There was also large scale migration of people from the adjoining districts of Travancore to work in the plantations; consequently there was rapid increase in the population on the hilly districts of Eastern division (See Table 3).

That migration was an important factor contributing to growth of population in this region is further evident from Table 4.

Table 4 clearly shows that as many as 30475 people born in Western division (mainly plain areas) were found to have migrated to and enumerated in Eastern division (largely hilly area) as compared to only 14056 people born in Eastern and migrated to Western Division. In terms of percentage of population as much

Table-3: Population Trend in Eastern Division Districts of Travancore (1875-1901)

(in lakhs)

Districts	Population				Annual Growth Rate (%)
	1875*	1881	1891	1901	
Shencottah	2.80	2.96	3.12	3.79	5.20
Pathanapuram	0.96	0.98	1.16	1.46	5.85
Thodupuzha	0.46	0.48	0.49	0.64	5.35
Muvattupuzha	2.30	2.40	2.40	3.21	5.37
Cardamom hills**	0.03	0.06	0.15	0.22	28.20

* Though the collection of data on population was started in Travancore as early as in 1836 and followed thereafter a few times before 1875, these data were not very reliable. Reliable data on population are available only from 1875 onwards and, hence, we had taken the data on population after this year. See, Census of India, 1931, Vol.XXVIII, Travancore, Part 1 Report, (1932); p.19

** Cardamom hills refers to areas in Undumbanchola, Peermade and Devicolam taluk of present day Idukki district of Kerala.

Sources: Census of India (1921) Vol.XXV, Travancore; p.7

Table-4: Movement of People in Travancore (1891-1901)

Birth Place	Enumerated in	
	Western Division	Eastern Division
Western Division	1658531	30475
Eastern Division	14056	1194184
Madras Presidency	11478	29025
Other Provices and States	6171	7505

Source: Census of India, 1901 Vol.XXVI, Travancore, Part 1, p.72

as 5.3 per cent of total population in Eastern division had come from outside the division. 2.42 percentage of this population had come from Western division. 2.30 percent of total population had migrated from Madras Presidency (especially from neighbouring Thirunelvelly and Madurai Districts). Among the various communities who migrated to the hilly region the Syrian Christians accounted for higher percentage in the total population of hilly taluks of Eastern Division (See Table 5).

Table 5: Christian Population in Eastern Division Taluks (1901-1921)

Taluks	Total Population in '000'			Christian population as percentage of the total population		
	1901	1911	1921	1901	1911	1921
Meenachil	70.7	78.9	160.2	54.9	59.8	59.6
Muvatupuzha	127.7	133.4	137.5	43.3	48.0	47.8
Thodupuzha	32.6	38.5	57.3	33.4	38.4	44.7

Source: Tharakan, Michael P.K.(1976) M.Phil Thesis; p.8

In sum, the policy of the State to encourage the cultivation of plantation crops coupled with development of infrastructural facility especially roads had facilitated large scale migration of population from the plains and the adjoining districts of the Madras Presidency to the hill ranges. The improvement in the socio-economic conditions of Syrian Christians and Izhavas facilitated their mobility to the hill ranges in search of employment and cultivation. The impact of this development on the forest economy will become evident from the subsequent sections.

Management of Forest Resources

Travancore had large extent of forest areas with extraordinarily large number of trees species.[26] Yet until the end of 19th century these forests did not contribute substantially to the revenue of the state. This was because of the inadequate organisational set up and the limited number of commercially saleable species. In this context we would examine what type of organisational set up existed in forestry sector and how the different timber species were felled and marketed in Travancore till 1860's. Then we shall examine the various measures the state had taken to increase the revenue from timber during post 1860 period.[27]

Organisational set up for forest management:

In the early part of the 19th century there was no seperate forest department for managing the forests of Travancore. A commercial agent cum conservator of forests with headquarters at Alleppey used to carry out functions of felling and transporting royal wood and certain non royal wood reserve trees[28] from forest areas bordering rivers like Achencoil and Ranni.[29] The same agent was also in charge of procuring Cardamom and Minor Forest Produce (MFP) which include items like Wax, Elephant tusk(Ivory) etc. Thus the work of commercial agent cum conservator involved not only the felling and sale of timber and MFP but also supervising the collection and sale of Cardamom.

But during the 1820's it was realized that carrying out the works of felling of timber and procuring of cardamom as well as selling them by one and the same organisation was not only difficult, but also inefficient. In order to improve this situation the government seperated the duties of conservator of forests and the commercial agent. Accordingly the conservator of forests had

the duty of procuring cardamom, felling and collecting timber and MFP and delivering these items to Alleppey depot of the government. The duty of commercial agent was to conduct the sale of these items.

However, this change in organisation of the forest department did not result in increased revenue from timber extraction and sale. This is evident from the relative importance of the revenue from sale of cardamom and Teak timber during the 10 years period preceeding 1865 (See Table 6). The relatively slow increase of revenue from timber could be due to the government's own policy

Table 6: Average Revenue from Teak and Cardamom (1856-66)

Year	Quantity of Teak forwarded to Alleppey depot (in Candies)	Total quantity forwarded to Alleppey (in Candies)	Average value per Candy	Average Annual revenue in Rs.'000'	Quantity of Cardamom supplied to Alleppey (in Thulam)*	Total quantity supplied in 10 Years (in Candies)	Average value per Candy	Average Annual Revenue in Rs.'000'
			Rs.				Rs.	
1856-57	4073				8457			
1857-58	3746				4554			
1858-59	4156				4201		**	
1859-60	4119				1944			
1860-61	4038				4968			
1861-62	4011	39470	16.5	65.13	1666	1127	1000	112.70
1862-63	4011				1840			
1863-64	3327				3707			
1864-65	3614				1616			
1865-66	4375				855			
	39470				33808			

Note: * Thulam = 20 English Pounds; Bourdillon, T.F.(1893) Op.cit; 160
1 Candy = 600 English Pounds (Ibid; Appendix I, IV)
1 Thulam = 1/10 candy

** Approx. Value; Ibid; Appendix I, No.1
Source: ART 1864-65; p.45 & Bourdillion, T.F.(1893), Op.cit; Appendix 1, p.ii

of giving less priority to the timber as a source of revenue. This was reflected in the (i) staffing pattern of the forest department, (ii) the control over forest lands and (iii) the mode of felling and sale of non royal woods.

As it is evident from Table 7, the staffing pattern of the forest department was largely weighted in favour of cardamom procurement and delivery.

Table 7: Staffing Pattern of Office of Conservator of Forests in 1844.

For Timber felling and delivery works	Number	For Cardamum procurement and delivery works	Number
Aminadars	2	Aminadars	2
Pillays	14	Sumprethy	1
Vijarippukaran	7	Writer	1
Accountants	6	Proverthikaran	5
Peons and Watcher	74	Vijarippukaran	6
		Pillays	14
		Peons and Watcher	97
Total number of staff	103		126
Total salary per month:	Rs.420/-	Total salary per month:	Rs.750/-

Source: Bourdillon T.F.(1893) Op.cit. p.159

Though the conservator of forests was responsible for the extraction of forest resource and its delivery the control over some of the important timber bearing forests in the state was vested with the revenue department. These areas included the forests in and around Shencottah, Kada Kaval forest lands on the Eastern slopes of Mahenthragiri hills, forests in Southern Travancore namely in and around Kumili, Peermade, Nagercoil and Trivandrum.

The main reason for this duality was that it was not remunerative for the government to bring the felled timbers from the forests in Southern Travancore upto Alleppey depot, as was being done in the case of other forests mostly situated near Alleppey in North Travancore. For example, for several years before 1870, the revenue from Shencottah forests used to be less than Rs.10,000 per year.

In Travancore, most of the non royal woods were allowed to be cut by private individuals from anywhere in the state. Upto 1884, a Seigniorage rate system was followed for the sale of all these non royal wood species. Under this system any one who wanted to procure non royal wood could obtain permits for felling and removing it by remitting a rate of one rupee per log from any where in the state. Not only these woods were allowed to be cut by any one from any where but very little supervision was exercised on their fellings and removals. The only check on the quantity removed could be made at few watch stations which were present along the major rivers. Under such conditions many people[30/] were able to smuggle either without paying any seigniorage or much more quantity than what they paid for.

Separation of Forest and Cardamom Department:

Till 1860's the conservator of forests used to perform the dual functions of collecting and supplying cardamom as well timber to the Alleppey depot, and cardamom used to provide relatively higher revenue to the government compared to timber. Under such circumstances, more time and attention was given to the works related to procurement and delivery of cardamom timber, by the conservator of forests.

The conservator of forests had to go "to Udambanchola in the cold season when the cardamom crop was ripening and to remain there till all the crop had

been gathered and weighed for transportation to Alleppey. This arrangement occupied a great deal of time, and the conservator was therefore prevented from attending to his other duties in connection with the collection and sale of timber".[31]

Consequently the conservator of forests was not able to supervise properly the works of felling and transport of timber especially during months in which cardamom collection and delivery works used to be in full swing resulting in illicit felling of trees.[32]

Moreover during those days the commercial agent was also not able to conduct the daily sales of timber at Alleppey depot, due to his preoccupation with the sale of Cardamom and other monopoly commodities of seasonal nature. Therefore a large quantity of timber used to lie in the depot for several years. This meant that a substantial amount of potential revenue used to remain blocked in the depot, due to non sale of timber.

In order to prevent illicit felling and increase the revenue from timber resources the government took certain concrete measures. The first step towards this was the seperation of duties related with Cardamom works from the conservator of forests in 1869.[33]

Once the conservator of forests was made to look after the works related with timber and other MFP alone, the successive conservators tried several steps to boost up the revenue from timber sale. These steps primarily fall under two categories viz. organisational changes and efforts to augment revenue earnings from timber. The former step largely involved the extension of the control of the forest department over forest that was earlier vested with revenue department.[34] The steps in the latter direction, which were more important than the former, included the following:

(a) Shift from Contractor to seigniorage system:

After the revenue forests were brought under the control of forest department with a view to increase revenue and prevent illicit fellings, they made several changes in the mode of felling and sale of timber in the forest areas. The importance of these changes becomes very clear from the case of Shencottah forests which were one of the important timber bearing forests in the State.[35]

When the forest department acquired Shencottah forests in 1871 the contractor system of felling and supplying was prevalent in these forests. Under this system the contractors used to fell and deliver certain specified saleable timber species at the various timber depots, which were often distantly situated.[36] The method of sale was auctions held on specified dates and no daily sales were conducted in these depots. With the result often many people were unable to reach to these depots on auction days. Under such circumstances a large proportion of such people in order to fulfill their timber requirements either used to fell timber illegally without paying any tax or used to utilize inferior timbers on which government did not levy any tax.[37]

In order to prevent indiscriminate felling of trees and step up the revenue, seigniorage system was introduced in these forests in 1873. Under this system people who had obtained permits after paying a certain seigniorage value of timber, were allowed to fell and take away the timber from the forest areas, nearest to their place of settlement. Consequent upon the introduction of this system, the revenue from these forests increased considerably in the first few years itself. For example by the end of very first year of this system i.e. by the end of 1873, the revenue rose to Rs.45,789 as compared to Rs.9,521 in 1870.[38]

Though this system contributed to increase revenue within a few years it resulted in loss of forest cover. This was mainly because many permit holders taking advantage of insufficient forest staff for supervision and inadequate penalising laws resorted to smuggling and illicit felling of timber. Hence the forest department reverted back to the contractor felling system in 1878-79. However, as a result of reintroduction of this system the revenue of the department declined to Rs.36,747 in 1879-80 and to Rs.26,881 in 1882-83. Consequently in 1882-83 the seigniorage system was reintroduced. But under this system, the activities of smuggling and illegal felling of timber increased again. So, just after two years, in 1884-85 the seigniorage system was replaced once again by contractor system.

In the areas that were traditionally under the forest department inorder to increase revenue and prevent illicit fellings and evasion of seigniorage charge (which used to occur in the case of non royal woods sold under seigniorage system) depot sale system was introduced in 1884-85. Under this system contractors were employed by the forest department to cut non royal woods to be brought to forest depots for sale. But this system was again replaced by seigniorage system, just after three years. This was because, under this system the total revenue obtained from non royal woods decreased considerably (See Table 8). Since after readoption of seighniorage system total revenue rose again (See Table 8) this system was continued thereafter.

(b) Efforts to augment export earnings from timber:

Till 1870's merchants from outside the state were the major buyers of timber. Naturally, revenue from the export of timber was important to the forest department. For example, out of the total revenue of Rs.2.31 lakhs in 1871 the revenue from export was Rs.1.30 lakhs whereas that from domestic sale was only

Table - 8: Revenue from Sale of Wood to Private Individuals(1880-1890)

Year	Value(in Rs.)	System of Sale
1880-81	26,216	
1881-82	22,735	Seigniorage system
1882-83	20,802	
1883-84	17,507	
1884-85	8,345	
1885-86	8,275	Depot Sale System
1886-87	7,855	
1887-88	32,427	
1888-89	65,303	Seigniorage system
1889-90	61,849	

Source:Bourdillon, T.F.,(1893) Op.cit; Appendix V

Rs.1.01 lakhs.[39] Therefore in order to attract more merchants from outside and to increase export earnings, the forest department started providing concessions to new contracts.

In the process the forest department was able to procure several small and big contracts from outside the state. In this context it is particularly useful to examine the case of one major contract which for the first time provided a large export market for Travancore timber. This contract was with a Bombay firm called Messers Wallibhoy Kaderbhoy Company (hereafter Bombay firm) in 1875-76. In the year of 1875-76, this Bombay firm placed an order for 14,000 candies[40] of Teak and 2,000 candies of Blackwood. In 1877-78 and in 1880 contracts were made for the supply of 30,000 candies of Teak and 1 lakh sleepers respectively.

It was for the first time that such large orders were offered by a single outside firm to the forest department. In fact during the period 1875-76 to 1891-92 the Bombay firm became the largest buyer of timber of all species. Because of this the forest department provided following concessions to this firm:

(1) the firm was favoured by providing timbers at prices lower than the ongoing market rates. Between 1866-1890 the prevalent prices for III, II and I class[41] of Teak Timber used to vary between Rs.13 to Rs.17 per candy. However, since I class teak was almost exhausted from the accessible forests of Travancore by 1870, the forest department was mainly supplying II and III class of Teak to the firm. The rates for II and III class Teak poles were reduced to Rs.13 and 10 respectively for the Bombay firm.[42]

(2) Prior to the emergence of the Bombay firm, buyers (outside or domestic) were neither allowed to select and weed out the defective logs nor given any reduction in prices on that account. However, the Bombay firm was provided with this facility for the first time by the forest department of Travancore Subsequently in the year 1882-83, the firm entered into a special contract with the forest department for ten years. During this period the Bombay firm had agreed to buy as much timber as forest department could supply to it.

Such an increase in demand for timber resulted in two important changes as far as forest management in Travancore was concerned. First, it made forest department to employ large number of contractors to fulfill its contractual obligations. This was primarily due to, two reasons: (a) during those days the forest department was poorly equipped with executive and supervisory staff, who could supervise such large scale felling and delivery of timbers to the forest depots. Out of 392 permanent employees in the department, only 13

employees were involved in supervision of felling and delivery of timber.[43] With such meagre staff, forest department found it difficult to supervise the works related with extraction and supply of timber. (b) Moreover, the officials of the forest department felt that the works done by private contractors were generally more cost efficient relative to the staff of forest department. In this context, the conservator of forests remarked in 1890-91 that the cost of felling and delivery by departmental agency had been 10 Rupees per candy previously, but after the contractors started doing this work, it had been reduced to 6 Rupees[44] Considering the above facts, the forest department started engaging increased number of contractors.

Secondly, this contract became instrumental in opening up of several new timber depots near various forest areas and severing of links with Alleppey depot. This was because, to fulfill the requirements of this contract, felling of trees was going on all over the state, but during those days bringing timber upto Alleppey depot from certain distantly located forest areas was a time consuming and difficult task for the department. Naturally efforts to bring timber from such far off forests could have caused delays in bringing the timber. These delays in turn would have caused a shortfall in the yearly quota to be supplied to the firm.

The impact of these contracts in terms of increase in revenue of the forest department was two fold. As can be seen from Table 9 that an amount of approximately Rupees 2 lakhs used to accrue to forest department directly from the sale made to Bombay firm.

On the other hand, there was an increase in the revenue from the domestic sale of timber also (See Table 9). It was to facilitate timely supplies to the

Table -9: Revenue from Timber Sale in Travancore (1871-1892)

(in Rs.lakhs)

Year	Value of Export			Value of Domestic Sale	Total Revenue of Department
	Total	All Foreign Market except the Bombay firm	The Bombay* Firm		
1871-72	1.31	1.31	-	1.02	2.33
1876-77	4.30	2.30	2.00	0.96	5.26
1881-82	3.77	1.77	2.00	1.79	5.56
1886-87	4.90	2.90	2.00	3.61	8.51
1891-92	4.62	2.62	2.00	5.42	10.04

* In the absence of exact figures, Bourdillon had suggested that the total revenue from the sale to Bombay firm was approximately Rs.2 lakhs

Source: Bourdillon T.F.,(1893) Op.cit; p.XIII

Bombay firm that the new depots were opened. However, the opening up of these new depots resulted in increase in domestic sale (and hence the revenue) because new settlements had come up around the forests during this period.

III

Impact on Forest Cover

The main outcome of changes in the agrarian economy by 1880's were increase in area under plantation crops and growth of human settlements on the hilly forested

lands (waste lands). At the same time the various changes in the management of forests resulted in the creation of a single administration to govern all the forests of the State. The adverse consequences of these changes on the forest economy of Travancore were the following :

(a) Permanent loss of forest Cover:

Until the middle of 19th century, most of the forested lands in Eastern division districts and entire hill ranges were uninhabited and had no plantation estates or any settlements on them. By 1880's approximately 43,000 ha. of coffee and tea plantations had come up on these lands. The first main step towards establishing a coffee and tea estate on the forested lands was to cut all the standing trees and every other type of vegetation on the land.[45/]

Evidently, establishment of plantation estates meant a permanent loss of forest cover. Similarly growth of settlements on the hills also meant permanent loss of forest cover, as settlers required tree-less lands for their house construction and cultivation of food crops.

Exact loss of area due to these activities is not known. However, some insights in to this question can be had from report of Lt.Ward and Corner and that of Bourdillon who surveyed the forests of Travancore. According to Ward and Corner 65 per cent of total land of Travancore was under forest. However, Bourdillon, who extensively surveyed the forests in 1890, estimated that 50 per cent of the total land area was under forests.[46/] This meant that during the period 1820-1890, 15 per cent of the total land area which was under forest or 23 per cent of the total forest area as existed in 1820 was deforested and put to other land uses in Travancore.

(b) Loss of revenue through large scale illicit fellings by Contractors and Settlers:

In order to appreciate the nature and gravity of loss of revenue through illicit felling by contractors and settlers, we have to understand (i) how a large number of forest contractors were employed and (ii) under what conditions the contractors and settlers were felling trees.

(i) In Travancore, prior to coming of Bombay firm, the native class of contractors was not sufficiently developed.[47] Hence, in order to attract the contractors for felling and delivering timbers at forest depots, forest department started advertising in papers and providing advance loans as an incentive to take up forest contracts. As a result, a number of people took jobs as contractors of forest department. Consequently, by 1890, as many as 135 contractors were working for forest department. In many instances these contractors further employed sub contractors to assist them. Thus, by 1890, not only there were 135 contractors but also several hundreds of sub contractors and 'Innumerable' labours employed by these contractors/sub contractors who were felling trees all over the State. It can be inferred from various historical sources[48] that most of these contractors, sub contractors and labours were the new settlers on the hills.

In the drive to increase the number of contractors, the forest department circumvented the necessary procedures of enquiring into the financial position of contractors, their experience in the field and past record of financial property. Such laxity resulted in the influx of new and inexperienced contractors, who misappropriated the advances taken by them from the forest department. This is evident from the increasing incidence of default on repayment of loans - upto

1892-93 the debts that were not repaid by contractors accumulated to Rs.74,540. Out of this amount Rs.40,000 was written off by the Government.[49] (ii) During those days, there was no forest code or any other comprehensive document describing rules and regulations on various activities of the forest department. Therefore (a) there was a general lack of essential rules regarding various aspects of forest department's functioning, (b) rights, duties and obligation of various contractors working in forests and (c) absence of laws to punish people committing any forest offence.

Thus, the various concessions and incentives resulted in increasing the number of contractors, sub contractors and labourers working all-over the state. At the same time the forest department continued to be under-staffed in supervisory and executive cadre. This resulted in the forest department being ineffective in controlling violation of the agreements by the contractors. Even if such violations were noticed it was virtually impossible to legally prosecute the offenders. An immediate consequence of this was the indiscriminate fellings and smuggling of timber.[50] While the contractors were resorting to indiscriminate fellings of reserve woods meant to be supplied to forest depots, many settlers were indulging in illicit felling and smuggling of non royal woods. Obviously, this process had resulted in the loss of forest cover and revenue to the State.

Under these circumstances, a growing realisation developed in the government and the forest department that there was an urgent need to consolidate the important forests in the state, to properly conserve and protect them from wanton destruction. Accordingly in the year of 1884, a special forestry commission was set up to discuss the management of the forests and to draw up suggestions for their better administration. The commission recommended a complete survey of the forests of Travancore,

in order to plan future management practices and policies.

Bourdillon, a senior forest officer, was appointed as special officer to carry out the survey of Travancore forests in 1887. Bourdillon submitted an exhaustive report on the forest of Travancore after three years of field survey.[51] Apart from discussing the past system of management being followed in Travancore, Bourdillon had provided suggestions for future management practices and policies.

The main suggestions made by Bourdillon were:

(1) In order to consolidate and protect the then existing forests in Travancore, all important timber bearing forest areas should be reserved and brought under legal control of forest department

(2) The fellings of trees in forests should be done under a scientific system. In Travancore, given the fact that evergreen and semi-evergreen type of forests are in majority, selection felling system should be adopted.[52]

(3) In order to enhance the future economic worth of forests the process of raising artificial plantations of commercially valuable species, especially Teak must be continued.

(4) There was an urgent need to improve infrastructural facilities like construction of forest roads, improvement of old bridge paths and cartways. There was a need to increase the staff strength, especially of supervisory officials. Also of modifying accounting systems and formulating a forest code.

Most of these recommendations were implemented by the State. The extent to which they had improved the management of forest resource in Travancore will be discussed in the following chapter.

Notes and References

1. Velu Pillai, T.K.(1940) Vol.I, pp.49-52.

2. Lt.Ward and Conner (1898); p.13

3. During 19th century alongwith other uncultivated lands most of the forested tracts were also considered as waste lands by the Government of Travancore. This is evident from the fact that various government rules providing forested lands for raising plantation were called waste land grant rules, like various rules having provided forest lands on the hills for tea, coffee and rubber cultivation.

4. Varghese, T.C(1970); p.31

5. Velu Pillai, T.K.(1940), Op.cit. Vol.III; pp.116-245

6. Ibid; p.191

7. Varghese, T.C.(1970) Op.cit.; p.47

8. To begin with a Pattom proclamation was enunciated in 1865 for Sirkar tenants. This was followed by the Royal proclamation of 1867 and the Jenmi Kudiyan Act, 1896, for the Jenomom tenants. See Velu Pillai, T.K. (1940) Op.cit., Vol.III, p.169

9. Varghese, T.C.(1970) Op.cit.; p.65

10. Administrative Report of Travancore (ART), 1865-66; p.32.

11. Ibid, p.56

12. Velupillai T.K.(1940) Op.cit. Vol.III; p.18

13. To cite one glaring example one Kannan Devan Hill Produce Company was given 1 lakh acre of land at the annual rate of 5 annas per acre. Another 215 square miles of land was given free, without any assessment. Further lands were granted on favourable terms to many other European planters, in most of the cases the rate of tax being Re.1 per acre for the cultivation of Coffee and Tea and Rs.2 and Rs.3 for the cultivation of rubber and cardamom respectively. Pillai, P.P.(Ed.) (1982); paras 65 and 70.

14. See Bourdillon, T.F.(1893); pp.4-5

15. Varghese, T.C.(1970) Op.cit. pp.107-118

16. See Jeffrey, Robin (1976) pp.93-94

17. Ibid. p.91

18. This was the result of a resolution adopted in a conference in 1863 that (i) an annual guaranteed sum of Rs.2 lakhs was to be spent on public works; and (ii) another Rs.20,000/- were to be set aside for the maintenance of the department. ART, 1865-66; p.80.

19. Varghese, T.C.(1970) Op.cit. p.31

20. Jeffrey, Robin Op.cit. p.139 and 155

21. Ibid p.121-126

22. Ibid; p.95

23. Izhavas were considered untouchables. Temple entry was prohibited for them. Their principal occupation was tending and tapping coconut palm. The demand for agricultural labourers was chiefly met by the labourers from this community. Most of these labourers were slaves to some rich Hindu landlords. Ibid; p.138-139.

24. Ibid. p.128.

25. This migration among Syrian Christians was facilitated by their nuclear family structure. (Ibid.pp.121-126). Though Izhavas were following matrilineal family structure, it did not become a hindrance to their movement towards hilly forested areas, as most of them had no landed property. Thus, Izhavas could easily break the joint family to set up their own nuclear families. Varghese, T.C. (1970) Op.cit. p.99.

26. For details regarding the composition and type of forests See
(i) Bourdillon, T.F.(1893) Op.cit., Passim
(ii)Nagam Aiya, V.(1906) Op.cit. Vol.I(Part I); pp.76-80.

27. Incidentally, excepting Bourdillon's report we do not have any other comprehensive study on the management of forests of Travancore for this period. Therefore in this section we would primarily depend upon Bourdillon's report.

28. Teak, Blackwood, Sandalwood, Ebony and Kol Teak were called Royalwood, white Anjili and all other trees available in the forest of Travancore were called Junglewood or non-royalwood. Apart from 5 royalwoods mentioned above, some non-royalwood trees were also declared reserve by the government, which could be felled and sold by government alone. By the end of the 19th Century, the reserve trees of the government included 5 royalwood trees and 20 non-royalwood trees.

29. During those days, the commercial agent was assisted by one assistant commercial agent, who was situated at Ranni river for carrying out similar operations.

30. As we shall see later in Section III, these people were mostly the new settlers, who had settled on the forested hilly areas due to the growth in plantation estates on them.

31. Bourdillon, T.F.(1893) Op.cit, p.162

32. Ibid, pp.161-162.

33. In 1869 itself, a seperate officer called Superintendent and Magistrate of Cardamom hills was appointed to look after cardamom works. Nagam Aiya, V (1906) Vol.III; p.469

34. To begin with the forest areas around Shencottah were transferred to the forest department in the year 1871-72. Kadakaval forest lands were transferred in 1882-83. In 1883-84, forests of South Travancore were transferred. Bourdillon, T.F.(1893) Op.cit.pp.162 and 165.

35. Because in Shencottah forests, Teak and Blackwood, the two most demanded and costly woods, were abundantly present.

36. These specified timber species were, Teak, Blackwood, Kongu, Venga, Venteak, Mayila, Chakkola, Thambogam, Thembavu, Nangu, Anji

37. Bourdillon, T.F.(1893) Op.cit. Passim

38. Ibid, Appendix V, p.XXXIX

39. The separate revenue figures of export and domestic sales are not available before 1871.

40. 1 Candy = $15\frac{5}{8}$ cubic feet.

41. These classes were based on the size of the timber. I class Teak referred to above 12 Virals (15 inches) quarter girth. II class was above 10 Virals ($12\frac{1}{2}$ inches)quarter girth. III class or Kol Teak below 10 Virals (below $12\frac{1}{2}$ inches) quarter girth.

42. There were some other factors which weighed in favour of reduction of prices for the Bombay firm. They were: (i) during those years prices of Teak in the neighbouring Cochin state were less compared to Travancore. Naturally, in order to attract the firm the forest department of Travancore had to offer concession in prices to make them relatively cheaper than those at Travancore; (ii) since the timber in Alleppey depot used to lie without sale for years together due to less demand large orders demanded by the firm gave the department a chance to clear out old stocks.

43. These include 1 Head Aminadar, 2 Range Aminadars, and 1 Reserve Inspector. Though three more Aminadars were stationed at Malayattur Konni and Nagercoil, they were mainly looking after administrative works. Rest of the staff was either involved in helping administrative works or stationary protective type of jobs like at watch stations and depots.

44. See ART 1890-91; p.76

45. For details, See Nagam Aiya, V,(1906) Op.cit. p.75-76

46. According to Bourdillon's report out of a total land area of about 7000 square miles about 3544 square miles was under forest cover.

47. Bourdillon. T.F.(1893) Op.cit. Passim

48. For similar views See Jeffrey,(1976) Op.cit. Passim,Bourdillon,T.F.(1893) Op.cit. Passim

49. Bourdillon, T.F.(1893) Op.cit. p.175

50. Ibid, Passim

51. Bourdillon's report is considered as one of the most authentic and exhaustive record on every aspect of forests of Travancore till 1890's.

52. In simple terms selection felling system means felling of only selected number of trees. The number of selected trees for felling for any species in any forest area is governed by such parameters as, total number of trees available, number of fully grown trees (exploitable trees), conditions of regeneration i.e., number of younger plants existing, etc., of that species.

Chapter 3

FOREST RESOURCE MANAGEMENT OF TRAVANCORE(1890-1947)

The recommendations of the Special Forestry Commission and Bourdillon's Report began to take shape in the form of programme and developmental scheme in Travancore in the 1890's. In order to ensure optimal use of forests, the State had envisaged both short term and long term objectives in resource management. The aim of the short term objective was to derive maximum revenue by extracting as much timber and minor forest produce as possible. On the other hand the long term objective was to preserve and utilize the forests in such a way that the direct and indirect benefits from forests in future could be maximised.

A number of programmes and projects were implemented to fulfil these short and long term objectives. However, it was noted that they were largely weighted in favour of short term objectives. In this chapter, apart from analysing the nature and extent of the programmes and developmental schemes and their manner of implementation, we have also examined the factors that had contributed to the shift in the objectives of forest management and their impact on the forest resource utilization. There are three sections in this chapter. Section 1 examines the management programmes and developmental schemes and theirimplementation. Section II analyses the factors responsible for the shift in management objectives. In Section III, the consequences of such shifts on the forest resource utilization is examined.

I

Management Programmes and Developmental Schemes

The content of the programmes chalked out to achieve the short and long term objectives of forest management were the following:

(i) To reserve all the important forest areas in the State so that it will be possible for the forest department to exert control over all the commercially valuable and strategically situated forest areas;

(ii) to formulate comprehensive working plans based on scientific principles to manage the reserve forests; and

(iii) to expand the artificial plantation schemes.

The main thrust of the developmental schemes were of an infrastructural and administrative nature.

(i) Reservation of forests:

The Forest Regulation of 1888 laid down certain procedure to be followed for declaring any forest area as reserve forests.[1/] This regulation postulated that the forests once reserved became the property of the Government except for certain rights which were granted to some people by the Forest Settlement Officer (FSO). No other rights of any kind either to forest produce or to forest la. d would accrue to any one.

It was in the year 1888 -89 that a forest block of 300 square miles was reserved for the first time near Konni. The forest department continued its efforts and were able to declare about 2325 square miles of forests as reserve

forests.[2] by 1909-10, which was about 32 per cent of the total land area[3] of the State. The area of reserve forests increased to 2396 square miles by 1934-35.

The implementation of reservation was carried out at a much faster pace during the initial years of implementation as is evident from Table 1. During the period (1889-1910) the average annual rate of growth in area under

Table -1: Progress of Reserve Forests in Travancore (1888-1935)

Year	Area under Reserve forests (in square miles)	Index of Area under Reserve Forests (1888-89 = 100)	Annual Growth Rate (%)
1888-89	300	100	
1894-95	345	115	2.5
1899-1900	1313	438	56.1
1909-10	2325	775	7.7
1914-15	2344	781	0.16
1919-20	2386	795	0.35
1924-25	2390	797	0.03
1929-30	2393	798	0.03
1934-35	2396	799	0.03

Source: Annual Administration Reports of Travancore, Various Issues, and Nagam Aiya, V.(1906) op.cit.

reserve forests was the highest - about 28 per cent. The increase in area was relatively faster during the initial 11 years. About 97 per cent of the total area brought under reserve forest was in this period.[4] The following factors had contributed to this:

(a) The increase in population and growth of plantation crops on the forested hills led to large scale deforestation through

illicit fellings and encroachments of unreserved forest lands during the end of 19th and early 20th century;

(b) The Forest Act of 1887-88 laid down that the forest department could demarcate the boundary of the reserve forests only after settling the claims and rights of people on forests. Any delay in settlement of rights could cause a delay in the declaration of reserve and consequently in the demarcation of proposed reserve forest. These delays in turn provided an opportunity to land grabbers and other cultivators to encroach upon forest lands.[5] These conditions which left to themselves would have led to loss of forest cover through encroachment and illicit felling prompted the forest department to carry out the reservation of forests at a faster pace.

(ii) Formulation of Working Plans:

After the consolidation of forests through reservation, the first step towards the attainment of a system of scientific management was the formulation of working plans. The basic content of the working plans was with regard to the nature of maintenance and mode of felling of forests. This was largely determined by two sets of factors:(a) the type of forests and (b) the nature of existing demand for timber. In order to cater to the existing demand and also ensure future availability of timber most of the initial working plans prescribed the selection mode of felling on a rotation basis.[6] Starting in the year 1895-96 a series of working plans were formulated. These working plans can be classified into three categories: (i) short rotation working plans (ii) long rotation working plans (iii) annual working schemes. The short

rotation working plans formulated during the period 1895-1900 covered an area of 1189 square miles spread over 13 reserves. These working plans prescribed 2, 4 and 6 years of rotations as the time lag between two consecutive fellings in the same forest block.[7] This meant that the felling operations in all the 13 reserves covering approximately 1200 square miles of area had to be completed within a period of 6 years. Since the forest blocks to be felled each year were of very large size in all the 13 reserves, and the rotation period was only 2,4 or 6 years the felling targets were not achieved in most of the reserves.[8] In order to obviate this problem the forest department started preparing working plans for smaller areas having longer rotation periods. Normally the rotation period used was 15 years or above.[9]

These plans made significant progress overtime. By 1910 such working plans were available for Shendurni valley, Teak plantation circle, and for most of the reserve forest areas belonging to Northern, Kottayam, Central and Quilon divisions. However, its implementation required an indepth understanding of the following aspects of the forest areas:

(a) expected pattern of future yield; as the future availability in yield was dependent on regulation of current yield.

(b) natural regenerative capacities of various timber species which would ensure future regenerative capacity.

(c) optimum age of felling various timber species, including optimal exploitable age.

(d) optimum financial rotation age.

Since such detailed information was not available, the implementation of such working plans could not fulfil the objectives and were beset with

a number of problem [10] More often than not the prescribed (targeted) annual yield from various forest blocks of reserves could not be achieved. For example, the working plan for Shendurni Valley circle (formulated in the year 1907) prescribed 15 years rotation. But, the plan's annual felling prescription could not be followed from 1910-11 onwards because the prescribed blocks for annual felling did not have enough mature tree species to be felled.

Such failures of short and long rotation working plans resulted in their being replaced by annual working schemes in the year (1922-23). It was recognised that the available data and information regarding the condition of forests and accessibility to the forests was still very poor to allow for proper planning. Therefore in order to avoid problem of non-availability of prescribed yield and other related details especially data on regenerative capacity it was decided to prepare annual working schemes for small extent of areas which had to be selectively felled.[11]

Accordingly, Government ordered in 1922-23 that "there was no necessity to prepare working plans for forest areas which were not likely to be taken up for working immediately for such reasons as inaccessibility, non-existence of timbers, heavy transport charges etc., and that such long rotation schemes need be prepared only for areas the working of which was either profitable or necessary for other reasons. (Otherwise, in future only) simple working schemes should be prepared every year by the officers incharge of the respective forest divisions"

As a result of this order, no uniformity of plans was maintained for managing and developing the forests along desired lines. After 1922-23 annual simple working schemes were prepared along with the old type of longer rotation

preliminary working schemes. With the result after 1922-23 the forest department of Travancore had annual simple working schemes and preliminary working schemes of longer rotation. While certain forest areas (mainly degraded forests, inaccessible forests and forests not to be worked immediately) were left as areas which did not require any working scheme.

For example, in the year 1934-35 out of a total reserve forest area of 2396 square miles, preliminary working schemes and annual primary working schemes were existing for 1001 square miles of reserve forest area, and another 63 square miles had been considered which do not require any working scheme. The process of preparation of the above mentioned two types of working schemes continued regularly. Thus, by 1943-44 out of a total area of 2401 square miles, there were sanctioned schemes for an area of 1087 square miles. Whereas schemes were under preparation for 238 square miles, it was considered not necessary to have it for another 1075 square miles of area.

This transition from short rotation working plans to long rotation working plan and finally annual working schemes resulted in the working plans being formulated to achieve the short term objectives of continuously extracting large quantities of timber to maximize revenue at the neglect of long term objectives - a situation quite contrary to the expected role of working plans, which it might be recalled, was to fulfil the short as well as the long term objectives. In fact apart from revenue maximisation and timber extraction, very few objectives were fulfilled through working plans. This is amply evident from an examination of the objective of localization of felling. The word

localised felling was used to incorporate two aspects; (i) to confine the actual felling on a limited area so that felling can be better managed and supervised, (ii) fellings should be done in such a manner and in such areas within the reserve forests that each year's felling should be more or less uniform and spread over the whole forest area such that it should not lead to overcutting of trees in one place and undercutting or no cutting in other place.

Since working plans were not based on adequate knowledge of the entire forests and were implemented with one year time horizon it resulted in the attainment of physical localisation of felling but not in the uniformity[13] and resulted in overcutting or undercutting. Hence it was observed that throughout this period the forest department implemented the prescription of working plans in such a manner that mainly works related with increased extraction of timber alone were endeavoured.

(iii) Expansion of Artificial Plantation:

Raising of artificial plantations of important timber was another programme under taken by forest department. This activity was directly linked to the supply and demand conditions of certain species of timber. While forests had a large number of tree species, only few were saleable and these were the species that were being increasingly demanded. To meet this increasing demand the department started raising artificial plantations of several species along with Teak.

Though the raising of artificial plantation had a long history in Travancore[14] till 1890 artificial planting works were done irregularly and

there was no fixed policy pursued with regard to the type, quality and extent of species to be planted each year. In fact, till 1890's the forest department concentrated their effort mainly on teak. With the change of policy in 1890's definite proposals were made to increase the area under artificial plantation in a planned manner.[15] However, the thrust continued to be on raising teak at the expense of a variety of other valuable species (like Anjily, Jack, Elavu, Mahogony, etc.). This is amply borne out by the fact that from 80 acres in 1866-67 Teak plantation increased to 2550 acres by 1904-05 and further upto 9826 acres by 1943-44 (See Table 2).

The priority accorded to the raising of teak plantation was due to the following reasons: (a) the familiarity with the growing technique of the teak plantation and (b) increasing demand for Teak. It was shown that the average sale of teak (proxy for demand) rose to 26000 candies [16] in 1903-04 from 4000 candies around 1856-57. The supply, on the other hand, in 1903-04 was estimated to be just 800 candies. Given such a gap between demand and supply the planting of teak received the highest priority.

In order to give further impetus to raising of teak plantation, the Government took steps to reduce its per acre cost of planting, which was relatively high.[17] Towards this end, the forest department adopted the Taungya system of planting in 1922-23.[18] The scheme of planting teak under Taungya system was doubly beneficial to forest department. Not only did it reduce the cost of planting per acre considerably but also helped the forest department to achieve its target of planting 640 acres of teak every year. As a result

of this the area under teak plantation rose from 7434 acres in 1824-25 to about 20,000 acres by 1943-44. The growth in area and reduction in cost per acre is evident from Table 2.

Table-2: Trend in Area and Cost per Acre of Teak Plantation (1924-44)

Year	Area newly planted (in acres)	Cumulative area of tea plantation (in acres)	Cost per acre (appx.) (in Rs.)
1924-25	699	7434	1.92
1925-26	910	8133	1.25
1926-27	825	9043	0.66
1927-28	575	9868	0.90
1928-29	553	10443	0.93
1929-30	518	10996	2.10
1930-31	511	11514	2.02
1931-32	575	12025	2.07
1932-33	574	12600	1.65
1933-34	676	13174	1.77
1934-35	608	13850	1.55
1935-36	558	14458	1.50
1936-37	593	15016	1.24
1937-38	538	15609	1.03
1938-39	608	16147	1.62
1939-40	700	16755	1.38
1940-41	831	17455	1.01
1941-42	856	18286	1.83
1942-43	684	19142	1.70
1943-44		19826	2.30

Source: (i) ART, Op.cit., various issues

(ii) Singh, Bright D.(1949) Op.cit.

Though beginnings were made to raise artificial plantation of several other species mostly junglewood, the total areas under these species were

negligible (See Table 3) as against the progress made in area under teak plantations. The prime reason for this was their low demand (saleability)

Table 3: Type and Area under Artificial Plantation in Travancore (1866-1944)

Name of the Species	Type of Plant	Year of initial Experimentation of Field Planting	Total Area Planted (in acres)		
			1866-67	1904-05	1943-44
Teak	Tree	1866-67	80	2537	17494
Thambogum	do	1904-05	-	6.00	-
Rubber	do	1904-05	-	78.50	157.00
Casuarina	do	Some time before 1904-05	-	142.20	108.00
Cashewnut	do	-	-	-	513.23
Red Gum	do	1929-30	-	-	71.75
Elavu	do	1934-35	-	-	84.20
Mahagony	do	1900-01	-	Few acres	-
	do	1900-01	-	do	-
Matti	do	1924-25	-	do	-
Jack	do	1942-43	-	do	-
Anjili	do	1934-35	-	do	-
(Boumbusa Vulgaris)	Bamboo	1900-01	-	do	-
(Dendrocalamus gigantes)	do	do	-	do	-
(Tephrosia candia)	Grass	-	-	do	-
Camphor Plant	Tree	1934-35	-	do	-
Napier grass	Grass	1924-25	-	do	-
Cinchona	Medicinal tree	1924-25	-	do	-

Sources: Various issues of ART, Travancore English Cellar Files, relevant pages.

and therefore less importance in terms of revenue to the forest department. This is evident from the fact that up to the first two decades of twentieth

century, the average annual quantity of royalwoods (mainly teak) sold was 6.0 lakh cubic feet (cft) as against 4.0 lakh cft of all the junglewood (which included about 25 species like Thambagom, Thembavu, Mahagony, Flav, Elavu etc.)

In their preoccupation to raise large scale plantation of teak at economical costs, the forest department largely over looked the works associated with raising artificial plantations of other valuable timber species. This essentially meant that the artificial plantations raising programme of forest department of Travancore did not consider the long term demand and supply conditions of most of the timber trees except teak.

Our preceeding discussion was confined to understanding the administration of forest through management programmes. For the meaningful implementation of these programmes it was necessary to develop infrastructure like roads and an administrative set-up. These aspects are briefly discussed below.

Development of Roads within Forests:

With the steady extinction of all important saleable species especially teak from the areas adjacent to rivers, which were the only possible mode of transportation, it was essential after 1880, for the forest department to develop forest roads and paths in order to reach the interior forest areas having saleable timber. This was required to regulate and oversee the felling and transport of timber from such areas.

Also, the working of forests on scientific lines required a better knowledge of the condition of the forests. This necessitated perambulation

and survey of the forests especially the hitherto untouched portions. Moreover, scientific working also envisaged a better protection of forests from encroachers. Obviously, for carrying out these functions there was a necessity to develop new roads and cartways inside the forests.

The development of roads was also seen as a way to relieve pressure from the "overworked portions of accessible forests and turn our attention to open out areas more remote and more difficult of access".[19]

This increased consciousness about the role of roads[20] resulted in the forest department incurring Rs.4000 in 1890-92 on the construction of roads and cartways for the first time in Travancore. Overtime the expenditure on development of roads increased. In 1894-95 the total expenditure incurred was Rs.9,660 and by 1899-1900 it was Rs.42,953.

Changes in Forest Regulation and Laws

The first Forest Regulation of 1867-68 as discussed earlier was formulated for the limited purpose of formation of reserves. Hence it could not provide sufficient safeguard to deal with illegal activities like encroachment and illicit fellings. Moreover it did not lay down exhaustive procedures for proper control and supervision of works associated with extraction of timber. That involved works from supervising the felling of timber at the site, measuring the quantity felled and overseeingthe transport of all the timber and other forest produce from the Government forests or private lands upto its destination via the prescribed checkposts under a legal pass.

In order to remove these shortfalls the forest department replaced the forest department replaced the Forest Act of 1866-67 with Forest Regulations

Act of 1892-93. This Act which became the basic source of rules and regulation in Travancore was modified as and when required.[21] Though this Act along with its several modifications were able to cover an entire gamut of procedures to supervise and check the work related with extraction of timber, the procedures related with controlling encroachments and illicit fellings still remained vague.

Increase in Staff Strength:

Bourdillon in his report had observed that efficient functioning of the department was handicapped by inadequate staff availability - the total staff strength in 1844 being 103 only. The distribution of total staff between controlling and supervising staff was also disproportionate. While the total staff strength increased to 392 by 1890-91 only 4 were controlling officers.

During the period under study although the total staff strength was increased further by forest department, it did not increase the controlling staff proportionately despite an already existing situation of dearth of controlling officers - the total staff number was increased from 392 to 559 by 1910-11, the number of controlling officers increased from 4 to 7 only. Such an approach of not increasing the controlling staff proportional to other executive and protective staff seems rational during those days considering the fact that the forest department was mainly preoccupied with works related with extraction and sale of timber alone.

Along with the changes in staff strength, the forest department made a thorough reorganisation of its administrative divisions of the forest areas in 1896-97. The total forest area was initially divided into five divisions to ensure better management till 1904-05.

Associated with change in administrative set up were improvements in the accounting system of the forest department. Till 1890's the method of accounting monetary transactions and other financial matters especially the accounting of expenditure of the forest department was cumbersome and therefore proper checking of the expenditure made, the accounting and recovery of the advances given to contractors etc. were difficult. To remove these shortcomings the forest department brought into force a comprehensive account code from the beginning of the year 1899-1900.

In sum, the purpose of all these administrative and managerial reforms was towards attainment of specified objectives. The development of roads increased the explorability of forests in terms of improved supervision, vigilance and extraction of timber and other forest produce. Similarly the improved system of accounting and the development of more systematic and legal framework was a step towards a better accounting system for revenue generated through various works (mainly timber sale). Again, this could ensure a better accountability from the officials about the expenditure and loss of revenue and had given the department a tool to penalise the defaulters of Government loan or offenders connected with illegal felling and removal of timber.

II

Factors Governing Shift in Objectives

Our discussion so far has revealed that there was a distinct tendency to accord priority to short term objectives to the neglect of long term objectives

of management. This is in contrast to the stated objectives which provided for fulfilling both the long and short term objectives. The reasons for this were the following: (a) revenue factor, which operated during pre World War II period and (b) the World War II factor. It is interesting to note that while these factors did contribute to the forest department's tendency to endeavour achieving short term objectives, largely it was so for diametrically opposite reasons. In the pre World War II period due to a lack of demand for wood and hence low level of revenue the forest department remained largely preoccupied with methods to increase its sale of timber. While during World War II period due to a sudden increase in demand for timber the preoccupation with extraction of timber not only continued but got reinforced. In other words while in the earlier period it was the lack of demand that led to concentrated efforts on increased extraction of timber in the later period it was due to increased demand.

Revenue Factor

During pre World War II period the forest department was preoccupied with finding ways to increase its revenue by raising the quantity of timber extracted and sold. This was necessitated by the increasing annual expenditure of the department for implementing various developmental schemes. Since forest department was being considered a revenue department it had to increase its revenue proportional to expenditure. However, the department was unable to rise to this expectation. This is evident from the trends in the expenditure and revenue of the department.

The total expenditure of forest department was Rs. 2.62 lakhs in 1067

1891-92 - the year when forest department in Travancore had just started

undertaking developmental schemes. It rose to Rs. 9.03 lakhs by 1938-39 , an increase of 245 percent over 1891-92. As against this during the same period, the total revenue of the department rose by only 162 per cent - from Rs. 5.72 lakhs in 1891-92 to Rs. 14.91 lakhs in 1938-39. The following factors had contributed to this slow rate of increase in revenue.

(a) On expiry of the contract with the Bombay firm a situation of low demand confronted the forest department of Travancore. This had once again led the forest department of Travancore to depend solely for its export on its usual timber importing centres - the neighbouring British Indian districts, State of Cochin and Bombay.

This meant that the export sale of forest department became totally dependent on conditions of import demand in these places. This created uncertainties and wide fluctuations in the export sale and earnings of timber. Some idea of the fluctuations in earnings from timber sale can be had from Table 4.

Table-4: Total Export Earnings from Timber (1890-1905)

Year	Value (in Rs. lakhs)
1890-91	2.92
1891-92	2.53
1894-95	3.41
1895-96	2.98
1900-1901	4.89
1904-05	1.62

Source: ART, Various issues

Due to uncertainties and the requirements of large initial investment the timber trade was not considered attractive business in Travancore - especially during late nineteenth and early twentieth century. This factor was responsible for the absence of big timber traders who could purchase timber in large quantities from forest department for domestic as well as export market. Consequently the forest department had to sell its timber through its daily sales depot like any ordinary private timber merchant .

However, this did not result in any increase in revenue as can be ascertained from the following example. When the forest department stopped daily sales in some years and tried regular auctions to limited number of timber traders, the revenue earnings of the department declined sharply in those years. In the year 1904-05 when the daily sale of timber was stopped, the revenue of the forest department fell from Rs.6.75 lakhs in 1903-04 to Rs.6.38 lakhs in 1904-05.

(b) During the second decade of 20th century inspite of an increased demand of certain species of junglewood for railway sleepers, the demand for royal wood and such junglewood which could not be used as sleepers had gone down due to eruption of World War I. In addition to this, with the onset of World War I the demand for timber from traditional importing centres was considerably reduced. Consequently there was an increase in the percentage of timber stock that remained unsold in the State (See Table 5).

(i) Depression of 1930's

Soon after the World War I, the export of timber from Travancore started

Table-5: Unsold Timber Stock in Travancore (1909-16)

Year	Total Quantity Extracted (in lakh cft.)	% Rise in total Quantity	Year-end Timber Stock (in lakh cft)	Index of Total Quantity Unsold	% of Stock Unsold Each Year
1909-10	8.86	100	2.56	100	29
1910-11	10.01	113	3.93	154	39
1911-12	12.18	137	7.00	275	57
1912-13	13.70	155	8.72	341	64
1914-15	16.36	185	10.01	391	61
1915-16	12.39	140	11.86	463	96

Source: ART, various issues

showing an upward trend[22] resulting in an increase in the revenue of the forest department. The revenue of the forest department increased from Rs.13.60 lakhs in to Rs.16.65 lakhs in 1929-30.

But during 1930's due to general global depression once again the process of increase in the revenue of the forest department was affected adversely. fact, during 1930's the total revenue of the forest department was less than the revenue of late 1920 period. This is evident from the Table 6.

Inspite of the fact that the unsold quantity of timber as a proportion of total timber extracted had declined in the 30's as compared to the late 20's, the revenue of the forest department declined in absolute terms. This would indicate that the prices of timber fell during the decade. Thus it appears

Table-6: Total Revenue of Travancore Forest Department (1928-39)

Year	Total Quantity of Wood Extracted (in lakh cft.)	Total Unsold Quantity as a proportion of timber Extracted (%)	Total Revenue (in Rs.lakhs)
1928-29	12.94	59	10.05
1929-30	13.74	-	16.65
1932-33	13.99	59	12.03
1933-34	12.96	57	12.84
1934-35	14.80	58	13.46
1935-36	12.40	52	12.93
1936-37	11.38	50	12.79
1937-38	17.94	50	14.20
1938-39	16.22	56	14.97

Source: ART, various issues

that the absence of increase in home market for timber, instability of the export market and the absence of big timber traders were the major constraints on the revenue raising efforts by the forest department. Inorder to overcome this situation of the accumulated stock of unsold timber, the forest department introduced new methods for sale of timber. Two such methods were (a) Lumpsum sale of forest trees to contractors and (b) Seigniorage method of selling to small traders and individuals.

Under the first method either all the standing trees or all trees of certain identified species or a certain fixed number of trees of identified species were sold for a fixed amount i.e. on lumpsum basis to a contractor.

The contractor was supposed to fell and remove such trees. The advantage of this method was that, on the one hand forest department did not have to fell and bring the timber to the depots for selling, on the other the department used to get immediate revenue. The forest department resorted to lump sum sale method quite often during the first two decades of 20th century.

In the second method the forest department allowed people (i.e. individuals requiring small quantity of timber for domestic use or petty contractors, small traders requiring small quantities of timber for trading) to cut the required trees (mostly non royalwood) from the forest on paying certain fixed rates called seigniorage rate. Obviously, through this method the forest department saved the trouble of felling and bringing trees for sale. Moreover this methods allowed raising of revenue immediately. The forest department increasingly adopted this method as can be seen from Table-7.

Table-7: Quantity of Timber Extracted through Various Agencies (1909-19)

Year	Quantity Extracted (in lakh cft.)			Index of Quantity of Wood Extracted by Individuals (1909-10 = 100)	Total Revenue (in Rs. lakhs)
	Total	By Government Agencies	By Non-Government Agencies		
1909-10	8.85	7.24	1.61	100	8.69
1910-11	10.01	8.46	1.46	-	-
1912-13	12.18	10.16	1.82	113	9.39
1913-14	13.70	11.41	2.29	142	12.93
1914-15	16.36	13.84	2.52	157	14.00
1915-16	12.39	9.29	3.10	192	13.55
1918-19	7.29	4.16	3.13	194	16.69

Source: Various Issues of ART

Table 7 clearly shows that the index of quantity of wood extracted by non-Government agencies kept on increasing during the war years. The non government agencies were (1) the contractors who used to buy wood on a lump-sum basis (2) the private individuals who used to buy on seigniorage basis. The table also shows that during this period the forest department doubled its revenue- from Rs 8.69 lakh in 1909-10 to Rs.16.69 lakhs in 1918-19.

With the advent of the World War II, the demand for all types of timber increased rapidly from the Department of Supplies of British India.[23] This gave an opportunity to the forest department to increase extraction and sale of its timber resources. It also provided ample opportunity to private enterpreneurs and industrialist to take advantage of this increased demand for wood products by starting forest based enterprises. All this had contributed to increased sale of timber by the forest department. The total quantity of wood sold in the year 1939-40 was 16.10 lakh cubic feet which increased to 25.71 lakhs cubic feet by 1947-48. An increase of as much as 59 per cent within just 8 years. The above facts get further corroborated by looking at the quantities of various wood items exclusively supplied by the forest department of Travancore to the supplies department in the 3 crucial years of World War II period (See Table 8).

Table 8 shows that in the three years during World War II days, out of the total quantity of wood sold as much as approximately 20% of total quantity was exclusively supplied to the British India's supplies department. Besides, as mentioned earlier a large number of wood based industrial units came up during this period. For example, a plywood factory was started as joint stock company (later it became totally government enterprise) called

Table-8: Timber and Wood Products Supplied to the Department of Supplied of British India (1941-44)

(in lakh cft)

Year	Total Quantity of Wood Sold	Total Quantity Supplied to Supplies Department	Col.3 as % of Col.2	Break up of Wood Supplies to the Supplies Department				
				Rose Wood	Jungle Wood	Teak	Railway Sleepers	ASCU Treated Wood
1	2	3	4	5	6	7	8	9
1941-42	19.01	3.83	20.14	-	-	-	-	-
1942-43	15.83	2.99	18.88	0.65	2.00	-	0.24	0.01
1943-44	14.28	2.58	18.06	0.73	1.56	0.29	-	-

Source: Various Issues of ART

Travancore Plywood Industries Limited in 1943-44. Around 1940, a paper mill based on reeds was started at Punalur called Punalur Paper Mills and in 1943-44 a factory for the manufacture of safety matches was established. Also by 1944-45 inorder "to meet large war orders for packing cases of all kinds many small saw mills have sprang up"[24/] Most of other woods based industries also came up during this war period.[25/] Due to increase in demand for timber the price of timber had also gone up during these years. Consequently there was a phenomenal increase in the revenue of the forest department (See Table 9).

Table-9: Revenue from Sale of Wood in Travancore (1929-48)

Year	Quantity Sold (in lakh cft)			Total Revenue (in Rs. lakhs)	Price (Rs./cft)
	Royal Wood	Jungle Wood	Total		
1927-28	5.47	4.66	10.13	13.98	1.38
1928-29	4.76	7.92	12.68	14.58	1.15
1929-30	5.78	8.79	12.57	15.82	1.25
1930-31	4.57	8.01	12.58	14.80	1.18
1931-32	-	-	-	-	-
1932-33	5.17	7.41	12.58	12.79	1.01
1933-34	6.16	7.22	13.38	13.65*	1.02
1934-35	6.27	8.18	14.45	13.01	0.90
1935-36	6.21	7.48	13.69	12.36	0.90
1936-37	6.62	6.35	12.97	12.15	0.93
1937-38	6.80	7.04	13.85	13.27	0.95
1938-39	7.26	8.84	16.10	14.97	0.93
1939-40	6.74	9.36	16.10	16.93	1.05
1940-41	7.28	8.09	15.38	18.55	1.21
1941-42	8.01	11.00	19.01	27.48	1.44
1942-43	5.07	10.76	15.83	31.80	2.00
1943-44	5.89	8.39	14.28	51.22	3.59
1947-48	-	-	-	80.58	-

Note: * There is some confusion about the revenue figure of 1933-34. While according to ART(1933-34) it is Rs.13.65 lakhs, the ART(1934-35) showed the figure for the same year as Rs.12.49 lakhs

Source: Various issues of ART

III

Impact on the Forest Economy

The forest department had to modify its comprehensive and scientifically

designed original programmes and development schemes for achieving the short term and long term objectives of forest management. In that process, the objective of management shifted largely in favour of short term.

In the pre World War II period due to lack of demand and lack of adequate information on the inventory of the forests (mainly of evergreen and semievergreen forests) the forest department instead of making efforts to acquire such information modified its working plans. The Short Rotation Working Plans were changed to Long Rotation Working Plans and that in turn to Annual Working Scheme, primarily with an aim to continue extracting as much quantity of timber as possible under different circumstances.

It was due to this reason that in the World War II period, the forest department modified (mainly enhanced) its felling targets to fulfil sudden increase in demand due to war conditions.[26] But such felling targets were not fixed on the basis of any scientific knowledge and information required to sustain the long term objectives of management. This meant that the process of selective felling was carried out arbitrarily.

Since it was based on arbitrary data, it resulted in excessive felling of the most demanded species and under felling of less demanded ones. Consequently evergreen and semievergreen forest of Travancore had been continuously degraded. The degradation used to be mainly in terms of loss of their multi-species character and over utilisation of the more demanded species without any knowledge about their stock and suppression of young regenerating saplings of the most demanded species by other useless species.

To appreciate the fact that there used to take place over utilisations

of most demanded species consider the case of softwoods. During World War II due to establishment of many new wood based industries the demand for softwoods increased considerably for the first time in Travancore. In order to fulfill this increased demand the forest department started felling large quantities of these softwoods. Consequently the relative importance of jungle wood in the total quantity of timber extracted had increased (See Table 10)

Table-10: Quantity of Wood Extracted (1936-44)

(in lakh cft)

Year	Total Quantity of Jungle Wood Extracted	Total Quanity of Royal Wood Extracted	Total Quantity of Wood Extracted	Column 2 as % of Column 4	Column 3 as % of Column 4
1	2	3	4	5	6
1936-37	5.51	5.87	11.38	48	52
1937-38	7.77	10.16	17.93	48	57
1938-39	8.56	7.66	16.22	53	47
1939-40	9.55	5.37	14.92	64	36
1940-41	9.09	6.35	15.44	59	41
1941-42	12.52	10.29	22.81	55	45
1942-43	11.08	4.59	15.67	71	29
1943-44	12.20	4.32	16.52	59	27

Source: Various Issues of ART

Since the large increase in quantity of softwood felled was made without the knowledge about their total stocking and regenerative capacity, it can be presumed that during the World War II period excessive fellings of softwood must have occured.

The programme of encouraging artificial plantation of Teak at the cost of other species was responsible for the forest departments inability to raise even few hundred hectares of successful plantations of these species. This has resulted in two harmful consequencies; (i) In the absence of artificial plantations which could compensate the loss of such woods (softwood and other jungle woods), the continuous extraction of these woods decreased the total availability of these woods; (ii) continuing lack of knowledge regarding the method of successful planting of these trees caused uncertainly about the future investment in such plantations.

An outcome of the excessive involvement of forest department in fulfilling revenue raising activities was that they had largely neglected activities which required long term planning on the basis of sound and extensive knowledge of structure and composition of forests. The non formulation of comprehensive and scientific working plans after thoroughly surveying the concerned forests and aquiring the knowledge about mean and current annual increment, regeneration capacity and relative stocking of all the important trees found in the forests, was the most important aspect of it.

Added to this, the method of timber felling and sale adopted from time to time for increasing revenue had resulted in degradation of forests and smuggling of timber. In the absence of adequate laws and regulation for preventing encroachment and illicit felling had not only resulted in loss of forest cover but also encouraged people to continue such activities. A variety of factors which were operating from outside the forestry sector quickened this process. In the Chapter that follows we will examine the role of these factors in the process of deforestation.

Notes and References

1. As per this regulation the main procedural steps required to constitute any forest area as reserve forest were:

    a. Selecting a consolidated tract of forest land for reservation

    b. Publishing the details of location, total extent of the selected forest area in the gazette and other public places, in order to provide opportunity to people to present their rights and claims before an officer (called Forest Settlement Officer, usually a non-forest official) before the expiry of a certain last date. Sections 4 to 6 of Forest Act IV of 1888 provide details about it

    c. Declaration of the forests as reserve through government gazette and at other public places after the rights and claims were settled by the Forest Settlement Officer, under Section 18 of the Forest Act.

    d. Demarcation of boundaries of newly reserve forest areas in order to prevent future encroachment and for better protection of the reserve

2. However, by 1909-10 the total reserve area under the forest department was even more. As reserve area included, apart from already declared reserve forests, those areas which were not yet declared reserve but were already gazetted by the forest department for declaring reserve, all such areas were called reserve lands. Thus, in 1909-10 the total reserve area was 2480 square miles i.e., 2325 square miles of reserve forests plus 155 square miles of reserve land.

3. Kerala tatistical records give the total land area of the State as 6731 square miles. This is at variance with Bourdillon's report which suggests it to be 7000 square miles. We have taken the figure from first source.

4. Incidentally, the process of reservation of forests in Travancore in the initial years was carried out at a rate faster than that of the neighbouring districts of Madras Presidency See Government CoverFile No.12 of 1001(1905)

5. In the Government Cover File No.C10232 1900-1903, referring to large scale encroachment on forest land due to delay in settlement of rights and claims, an interesting case was mentioned. One Nellaperumal Pillai had occupied 940 acres of land in Veerapuly reserve. According to village records he should have possessed only 139.94 acres of land. It was evident from the discussion on this case in the file that the main reason for such a large amount of illegal possession by a single person was the delay in settlement of rights by the Forest Settlement Officer. As for long years the forest officials could not demarcate the reserve forest boundary, Nellaperumal could enjoy illegal possession of more than 800 acres of forest land for almost 16 years.

   In the same cover file, the Conservator of Forests referring to the continuous loss to the forest cover caused due to delay in settlement of rights (vide letter No.1676-78 dated 12 December, 1902) wrote to the Diwan of Travancore that Veerapuly No.31 and Veerapuly Extension No.38 were gazette under the same section on 25th Panguni 1072 (ME) These tracts have been notified under section 6 on the 16th Chittray 1072 and 20th Audy 1072, respectively, nearly six years ago. In spite of this long delay, the reserves are still unsettled and the consequence is that government is losing every day. I have therefore the honour to request you to be good enough to take necessary steps for their early settlement"

   In this connection - it is interesting to note the reaction of the the forest officials to the existing situation and its implications for forest area. For instance the Divisional Forest Officer, Quilon, in his report of suggestion for improvement to be brought about in the forest management submitted to Conservator of Forests in 1905 stated "All lands that have not yet been reserved should be taken up at once and reserved... At present vast areas of forest land are thrown open for the use of the villagers and they without any regard to the future cut trees and set fire to the forest and smuggle timbers. These forests can be well protected when once it is reserved and brought under control". (See Government Cover File No.351, 1081 dated 18 October 1905) For similar observations, see also Government Cover File No.12 of 1001 dated 28th October, 1905 Government Cover File (No.7612 1902).

6. One of the basic reasons for adopting selection felling method was to convert the existing abnormal forests i.e., forests having less number of important tree species with lots of overmature and dead trees and inadequate number of young healthy saplings into more or less normal forests i.e., forests having enough useful trees with abundant young saplings.

7. Since working plans are made for large chunks of forest area comprising more than one reserve having hundreds of square miles of forest area, it is difficult to carry out felling in the whole area in one year. Thus, in order to carry out felling operations in a phased manner the total area is subdivided into smaller portions. Each of these small portions of forest area to be cut every year is called a forest block.

8. Generally annual felling targets are arrived at by dividing total forest area by rotation.

9. For example, in the year 1907-08 working plan was made for Shendurni Valley. The total area of the forests covered under the plan was 73 miles and 188 acres. The rotation was 15 years. Obviously, in this plan, the annual area needed to be felled every year or annual felling blocks were much smaller in size than in the initial working plans.

10. For details, see Appendix 2

11. ART, 1916-17; p.17

12. ART, 1925-26; para 53 (Insertion mine).

13. This is evident from the fact that it was due to uncertainty regarding regular availability of prescribed annual yield (prescribed in the working plans) that long rotation working plan of Shendurni and Teak Valley plantation had to be abruptly stopped when during 1910 onwards the available forest areas did not have enough tree stock. Obviously this situation could only arise in the absence of knowledge of all the forest areas falling under Shendurni and Teak Valley plantations.

14. It was as early as 1866-67 that the seeds of teak were sown in Vemburnum Island above Malayatturand at Konniyr for the first time. An area of 85 acres was planted in this year. By 1880 is efforts were also made to artificially plant certain other commercially important species like Sandalwood, Mahagony, Cerra Rubber, Casuarina and Thambogan. With the result by 1904-05 Travancore had 2550 acres of Teak and 6,79,142 acres of thambogam, rubber and casuarina plantations respectively.

15. Regarding artificial plantation Bourdillon said "Here in Travancore we must not give up planting altogether we should endeavour to make a regular addition to the acreage of our plantation every year" (Bourdillon, T.F. (1893), Op cit; p.202). Consequent upon Bourdillon's suggestion development of artificial plantation was planned and regularised.

16. See Government Cover File 12 of 1001 (1905) Op.cit.

17. For instance, in Burma the per acre cost of planting was Rs.10/- as against Rs.20/- in Travancore.

18. In general terms, Taungya system can be defined as the system in which the forest department leases out forest lands to contractors for 2 to 3 years in order to reduce the cost of planting, protecting and tendering the young plants like teak,sal , etc. In lieu the contractors are allowed to cultivate, along with forest plants, certain annual crops like wheat, paddy, pulses, etc. Thus, under this system forest department gets 2-3 years old forest crops in a good condition by doing a little supervision and by spending much less than is required for department planting. At the same time the contractors get income through the crops grown by them during the lease period.

19. Communication between Deputy Conservator of Forests, (Special duty), to the Conservator of Forests, dated 28th October, 1905. See Government Cover File No.12 of 1001.

20. Around the beginning of the 20th Century various forest officials took up this issue with the Government and departmental senior officers. For example, in 1901 the Divisional Forest Officer, Kottayam, in his letter dated 8th November, 1901, explained to the Conservator of Forests the necessity of undertaking several works pertaining to improvements in communication. It said "The work which I recommend to be undertaken are (1) opening a cart road from Angamali to Chulliguard station.... If this road is opened the forests both inside and outside the Reserve could be worked and the produce which can not be advantageously floated down by waterways can be removed along the new route to Angamali". (See Government Cover File No.C 10518). In the same letter he emphasized the need for constructing several bridle paths and blasting off big boulders which used to block the movement of logs through major rivers also. He submitted to the Conservator an estimated proposal of Rs.73,500/- on the basis of rough estimates of expenditure needed to be carried out on improvement works.

21. For instance, it was modified through the Modifying Acts of IV of 1071 ME, IX of 1085 ME, IV of 1089 ME, XIII of 1097 ME, and XII of1112 ME, See Second Supplement to Travancore Land Revenue Manual (TLRM) Vol.I, 1920; pp.558-565

22. This can be observed from the fact that although the total quantity of wood extracted remains more or less same in 1920's as during War periods, the unsold stock of timber decreased considerably. For example, in 1915-16 (i.e. during War days) the total quantity extracted was 12.39 lakh cubic feet, but the total unsold stock was 11.86 lakh cubic feet. While in 1925-26 though the quantity of wood extracted was still almost the same i.e. 11.16 lakh cubic feet the unsold stock got reduced to 6.36 lakh cubic feet. This clearly indicates that during 1920's the sale of timber had increased.

23. See ART, 1940-41;pp.111, 115 and 116

24. Ibid; 1943-44; p.93

25. In 1941-42 a pencil factory, though still under construction started production. In 1942-43 more than 20 bobbin factories were set up. By 1942-43 the manufacture of pith hats and other wood based articles also got a fillip. By 1944-45 due to increased demands for toys a number of toy factories had come up in and around Trivandrum and Quilon

26. In this context it can be seen that in 1942 justifying the sudden increase in extraction of 9.16 lakh cubic feet of timber over previous year's total extraction it was recorded that "This appreciable increase was due to the more intensive working of timber according to the prescription of the new working plans" ART, 1942-43; p.41.

Chapter 4

POPULATION GROWTH, EXPANSION OF CULTIVATION AND ITS IMPACT ON FOREST COVER (1890-1947)

The destruction of forest cover which was visible in the last quarter of the 19th century began to accelerate during the first half of the 20th century. This was partly facilitated by the internal developments in the forestry sector. But to a large extent, the loss of forest cover during this period was the direct and indirect effect of population growth in the highlands, and the expansion of cultivation in to the forest area. The manner in which these forces developed overtime and theireffect on forest cover is the principal concern of this chapter.

This chapter is organised in to two sections. Section I analysis the growth of population and expansion and cultivation in the forested hills. In Section 2 we have attempted to bring out the impact of these factors on the reduction in forest cover.

I

Population Growth and Expansion of Cultivation

During 50 years from 1891 to 1941 the total population in Travancore had increased from 25.6 lakhs to 60.7 lakhs. On analysing this general

increase in population across the three natural divisions, it becomes evident that the increase was highest on the forested highlands[1/] as compared to the mid and low lands (See Table 1). While the population

Table 1: Population Trend in the Three Natural Divisionsin Travancore (1891-1941)

(in lakhs)

Year	Low Land			Mid Land			High Land		
	Population	Index Number*	Density**	Population	Index No.*	Density**	Population	Index No.*	Density**
1891	12.92	100	-	11.78	100	-	0.88	100	-
1901	14.77	114	1075	13.66	116	502	1.09	124	31
1911	16.72	129	1217	16.14	137	593	1.42	162	40
1921	19.23	149	1400	18.95	161	696	1.88	214	53
1931	23.89	185	1739	24.15	205	887	29.09	331	82
1941	28.05	217	2041	29.00	246	1066	36.36	414	102

Notes: * Index of Population (1891 = 100)
** Population per square mile

Source: Census of Travancore, 1941, Part I & II, Imperial Table II, Subsidiary Table 1, p.41

increased four fold in the high land, it was only doubled in the low and two and a half fold in the mid land.

Apart from the natural increase, an important factor that had contributed to the faster growth in population in the high land was the inmigration from the neighbouring regions. This is evident from the data on inmigration of population as reported in the Census for the natural divisions of the state. According to

the 1921 Census the percentage of migrants in the total population was about 12 per cent in the highlands whereas it was around 3 to 4 per cent in the other two regions (See Table 2). Though, there was migration of

Table-2: Population Migration till 1921

(%)

Name of the Natural Division	Home born	Inmigration from			
		Inland	Sea Coast	Mountaneous	Outside
Sea Coast	95.8	2.7	-	0.5	1.0
Inland	97.1	-	1.6	0.7	0.5
Mountaneous	88.4	3.1	3.2	-	5.3

Note: Till 1921 the Highland, Midland and Lowland were designated as Mountaneous, Inland and Sea Coast divisions respectively in the Census reports of Travancore. The fact that the type and extent of geographical areas under new and old nomenclature was almost identical can be inferred from various Census reports of Travancore. For example, refer, Census of India, 1931, Vol.XXVII

Source: Census of India, 1921, Vol.XXV, p.30

population from the other two natural divisions in to the highland, the migrants from outside Travancore also contributed to a high percentage of the total inmigrants to this division. This pattern of inmigration continued to exist in the following two decades. According to the 1941 Census, out of the 1.35 lakhs inmigrants in the State 57 per cent were seen in the high lands (See Table 3).

Table-3: Inmigration from Outside Travancore

People born in Provinces and States adjacent to Travancore	Natural Division where Enumerated					
	Low land		Mid Land		High Land	
	No.	Inmi-grants (%)	No.	Inmi-grants (%)	No.	Inmi-grants (%)
1,35,000	35000	26	23000	17	77000	57

Source: Census of Travancore, 1941; p.43.

The increase in population in the forested highlands naturally affected the forest cover of Travancore during this period. In order to fully appreciate the role of population growth on deforestation it is necessary to examine the expansion of cultivation on the forested hills. In this context it may be noted that the expansion in cultivation in the forested hills was partly facilitated by the deliberate policies and efforts of the Government of Travancore. Around the beginning of 20th century, the State started making deliberate efforts to encourage people to move to the hills for cultivating plantation crops like cardamom and rubber and food crops, in addition to its already existing policy of supporting tea and coffee.

Increase in area under Cardamom

Until 1890's the trade in cardamom was a state monopoly. The procurement price (Kudivillai) given to the ryots under state monopoly was not attractive

enough for them to increase the area under cardamom. Since there was enough potential for increasing the production and therefore revenue from cardamom sales, in order to encourage ryots to undertake its cultivation, the government abolished cardamoms monopoly in 1896 and pronounced a number of concessional waste land grant rules.[2/] To begin with simple rules were made for leasing in forest lands for cardamom cultivation. A uniform land tax was introduced on all cardamom lands.

Eversince 1896, the government continued its policy of encouraging new ryots to cultivate cardamom crops under the high land forests. Rules of 1896 were modified in 1899, which were in turn further modified in 1905, 1913, 1935, 1937, 1939 and 1942. Apart from providing land on leases, the government through these new set of rules introduced a scheme of assigning cardamom lands to prospective cultivators on payment of Tharavilla (land value). The Tharavilla rates were also kept very low. Initially, it was Rupees 10 per acre, which was subsequently modified to Rupees 25, and till 1942 the rate was as low as Rupees 85 per acre.

The effect of all these favourable rules was that the area under cardamom cultivation increased tremendously in the Cardamom Hill Reserve (henceforth CHR) as is evident from the Table 4.

Increase in area under Tea and Rubber Plantation

The state policy of encouraging the cultivation of tea and coffee by granting waste land at concessional terms continued during post 1890

Table-4: Area under Cardamom Cultivation in Travancore (1900-46)

(in '000 acres)

Year	Area
1900-06	15.0
1911-16	21.0
1919-22	24.6
1929-32	51.8
1935-39	56.6
1942-46	59.6

Source: Nair, K.N. et al (1984) 'Development of Cardamom Plantation in the High Ranges of Kerala, p.39

period also. Accordingly the government modified its waste land sale rules of 1862 and 1865 - which granted lands for raising plantation crops on the hills on concessional basis and without any ceiling on the extent of individual holdings by other sets of favourable rules in 1898, 1913, 1916 and 1920.[3]

After the failure of coffee plantations on the hills of Travancore people took to growing tea for two main reasons. First, tea was much more adaptable species than coffee, as it can be grown within a larger altitude, ranging from sea level to 6000 feet, mainly because it requires less overhead shade after nursery stage, in the field. Secondly, in the initial years tea estates remained comparatively free of any major our break of diseases.[4]

Due to these reasons the area under tea started increasing rapidly approximately 3,000 acres in 1890 to 51,000 acres by 1920-21 (See Table 5).

Table-5: Area under Tea and Rubber Crops in Travancore (1890-1945)

(in '000 acres)

Year	Total area under Tea	Total area under Rubber
1890	3.00	-
1920-21	51.46	48.50
1930-31	80.14	60.59
1940-41	75.93	98.48
1944-45	77.26	109.75

Source: Panikar, P.G.K. et al. Op.cit.(1978), p.7

During the next two decades with the rise in demand for tea and its export prices[5] the area under tea further increased to approximately 77,000 acres by 1944-45.

An interesting development in the p st 1890 period was the introduction of rubber cultivation. This crop was first introduced in Travancore in 1903, by a British planter. Just a few years later, when the possibility of development of rubber plantation in Travancore became evident, the government in the year 1906, announced rules for granting lands on easy terms and conditions. The rate of assessment on lands granted for rubber cultivation were: (i) 6 annas per acre for first five years and (ii) Rupees 2 per acre from the commencement of sixth year.[6]

Due to such favourable terms suitability of rubber crops to Travancore

climate and its high demand the area under rubber increased considerably. Within 15 years of establishing first few plantations comprising of about few hundred acres around 1905, the acreage under rubber plantation increased to 48502 acres by 1920-21 (See Table 5). The government continued its policy of providing special attention to the cause of rubber planters later also. This is evident from the fact that during 1930's when price of rubber had fallen and affected the rubber trade, Government accepted the proposal made by rubber planters of reducing[7] the land tax on rubber lands from Rupees 2 to Rupees 1. As a result of such patronising by the state, the area under rubber cultivation continued to increase overtime on the mid and high lands of Travancore - from 48502 acres in 1920-21, it increased to 109749 by 1944-45.

Leasing out forest lands for food production:

By 1880's the state of Travancore became a food importing country, from a food exporting one.[8] But inspite of food shortage ryots in all the three natural divisions gave more importance to the cultivation of cash crops instead of food crops. This was mainly because, it was advantageous for the ryots to produce and export cash and plantation crops and import rice.[9] However, this process met with difficulties during years characterised by acute shortage of food either due to fall in domestic production or difficulties in importing it from outside. In the high-lands, where most of the area was under plantation crops, the effect of shortage of food was felt more severely than in other divisions. In this situation, to increase the availability of food in the hill areas the state encouraged the ryots to increase

the area under food crops. As a first step towards this, the overnment of Travancore announced rules for granting waste lands for cereal cultivation within CHR in 1898. These rules were applicable to cardamom ryots also. Those ryots already holding cardamom lands were granted grass-lands and swamps not fit for cardamom cultivation within CHR for a period of three years at concessional rates. The assessment rates were as low as $\frac{1}{4}$th of British rupee per acre for dry and 1 British rupee per acre for wet land.[10/]

This rule was modified in 1901 to make the terms of grant more attractive. The role of 1901 increased the initial period of grant to 12 years. Moreover it provided that the tenure can be extended by government after expiry of 12 years. Further, according to this rule the maximum land granted could not exceed the total extent of the land holding of the concerned ryots. Incidentally, this clause had played a very crucial role in facilitating some rich ryots to initially acquire larger holdings and later, to indulge in profiteering and encroaching forests lands in CHR.

Given such favourable rules for grant of lands it is natural to presume that many cardamom growing ryots would have taken up lands for food cultivation in CHR. The data regarding the extent of area put under food crops in CHR is not available. However, since the number of cardamom holdings and area had increased rapidly one would expect an increase in the area granted for food cultivation.

During first World War period when import of rice became difficult and domestic productions of food was not keeping pace with increase in production, a situation of acute shortage of cereal food arose in Travancore.

Consequently prices of food items especially rice rose in the initial post war years.[11] Under such situation, in order to increase domestic production of paddy, the government resolved to "disafforest" and throw open lands for cultivation of paddy within reserve forests on the highlands.

Accordingly, three committees were appointed by government to propose such areas within reserve forests of Peermade, Devicolam and Pathanapuram taluks. The Peermade committee proposed disreserving of 1000 acres of lands from within the reserve forests around Peermade and Kumili areas.[12] This policy of utilizing lands from within the reserve forests for paddy cultivation became so important for the government that the forest department took it as one of its policy objectives.[13]

Consequent upon adopting the policy of disreserving forest lands for food production, all the working plans, made for different divisions after 1920 used to propose areas within the reserve which could be for this purpose.

A similar process of leasing forest lands to ryots was noticed during World War II. With the outbreak of World War II, the situation of food shortage arose once again. As in World War I period the government set up committees to recommend ways and means of increasing domestic production. The recommendation of these committees were identical to those of made by the earlier committees - i.e. to release suitable swampy, reed and dry acres from within the reserve forests to the people.

Due to urgency involved the work of releasing forest land progressed quite fast. Starting from about 3000 acres of land which was leased out in 1942-43, the total area allotted for leasing out for food production upto 1948-49 was 12,763 acres.

Increase in Ghat road mileage:

The agricultural expansion in the highlands of Travancore was partly facilitated by the development of ghat roads. The Government of Travancore continued its policy of construction and maintenance of roads at a faster pace, as was the case before 1880. This is evident from the fact that expenditure incurred by PWD on roads increased from Rupees 2.4 lakhs in 1880-81 period during post 1880 period also it was the works related with construction and maintenance of roads on the ghat, primarily to help the planters, which was been given maximum attention by the government.

The following facts would substantiate our argument. There is a positive relation between increase in area under a major plantation crops grown on hills and the increase in mileage as well as expenditure on Ghat roads in Travancore. The increase in the index of area under plantation crops shows that it was higher in the post 1920 period than pre 1920 period. For example, the increase in the index of area of cardamom and rubber during 1920-1945 was 242 and 226 as compared to 164, and 194 respectively during 1900-1920 (See Table 6)

The total expenditure on roads had also increased comparatively faster after 1920's in Travancore. From 1880 to 1920 the increase in index of total

Table-6: Area under Cardamom and Rubber Crops during Pre and Post 1920 Period - A Comparative Picture

	Cardamom	Rubber
Approximate Area in 1900	15.00	25.00**
Approximate Area in 1920	24.60	48.50
Approximate Area in 1945	56.60	109.75
Index of Area in 1920 (1900 = 100)	164	194
Index of Area in 1945 (1920 = 100)	242	226

Note: ** Figure relates to 1910

Source: (1) Various issues of ART
(2) Panikar, P.G.K. et al, (1978) Op.cit.

expenditure on roads was 398. While in next 20 years after 1920 it rapidly increased to 674. (See Table 7). This in turn had led to increase in mileage of main roads in Travancore.

Table-7: Expenditure on and Length of Roads in Travancore

(1880-1940)

Year	Length of main roads (in miles)	Total Expenditure on roads (in Rs. lakhs)	Proportion of Expenditure on roads to total public works Expenditure
1880-81	975.5 (100)	2.40 (100)	26.8
1890-91	1530	2.98	33.0
1900-01	2171	4.99	22.4
1910-11	2204	6.34	24.7
1920-21	2629 (270)	9.57 (398)	28.2
1939-40	3587 (367)	16.19 (674)	52.3

Note: Figures in parantheses show respective index numbers

Source : Singh, Bright D.(1949) Financial Development in Travancore; p.449

II

Impact on Forest Cover

The process of population growth and expansion of cultivation in the hill ranges contributed both directly and indirectly to the reduction of forest

cover. The direct reduction took place due to the permanent displacement of forest cover by plantation crops like tea and rubber. During the period 1890 to 1945 approximately 1.90 lakh acres of forest land was brought under tea and rubber crops; of this rubber occupied abut 1.10 lakh acres and the remaining 0.80 lakh acres was under tea. However, a more harmful process of deforestation in the hill ranges was set in by the growth of cultivation of cardamom and food grains within the evergreen forests.

In principle cultivation of Cardamom crops should not cause any harmful effect on Evergreen forests. For the growth of Cardamom crop the Evergreen forests, microclimate - i.e. the features like characteristic shade, moisture, dense overhead tree canopy is very essential.[14/] However, during the period when efforts were made to increase the area under cardamom crop the existence of (a) laxed provisions in various government regulation for granting land for cardamom cultivation (b) dual control in cardamom hill reserve and (c) leasing out land for food production resulted in large scale encroachment and deforestation in the cardamom hill reserve. The manner in which these factors operated and set in the process of encroachment on forest land is briefly discussed below.

In order to encourage ryots to take land on cardamom hills, certain laxed provisions were made by the government. For instance, Rule 2 (i) 2(ii) and 2(iii) of the cardamom Land Assignment of 1905 provided that occupation of Cardamom hill reserve lands without permission of the concerned authority would also be regarded as a possible element for consideration for providing

registry. In the beginning of the century such deliberately laxed rules to encourage ryots to settle on cardamom hills were necessary given that their incomes from cardamom prior to 1896 were quite low and hence not an adequate incentive for them to settle in the CHR.

Rule(5) gave discretion to the government for granting or not granting the registry to such people who had occupied cardamom lands without permission, after considering the issue that whether such a grant is essential in public interest.The main criterion for judging the "public interest" used to be the numerical strength of such people and the improvements on lands, if any, which might have been made by such people.

The process of occupying lands on cardamom hills by taking recourse to Clauses (i), (ii) and (iii) of Rule 2 without taking permission of required authority was greatly facilitated by the dual control of CHR. In CHR all the trees belong to forest department while the land on which these trees were growing to the revenue department.[15] This basically meant that the forest department had the responsibility of protecting or managing these trees while the revenue department had to deal with matters related with grants of these lands. This duality of control gave rise to confusion and development of an unhealthy relation between the official of forest and revenue department.[16] Under these circumstances many ryots used to encroach into new forest land and cut the trees and other vegetative growth either by the connivance of revenue staff or illegally, to grow cardamom or for settling. Once the trees were cut the forest officials could not take any action, since at the same time

the encroaching ryots used to apply for getting registration for such land on the strength of Clauses (i) (ii) and (iii) of Rule 2 to the revenue authorities.[17]

Upto the first two decades of 20th century the extent of encroachment was quite low. However with the increase in demand for lands on cardamom hills, due to prevalent high prices and high productivity[18] of cardamom especially after 1920's incidence of occupying lands without permission on cardamom hills increased considerably. This was also facilitated by subsequent rules issued by the government like in 1913, 1935, 1937 which did not modify Clauses (i) (ii) and (iii) of Rule 2 of 1905 Act. Faster growth in population on the cardamom hills was another factor which contributed to large scale encroachment. The increase in population increased the demand for land for non-cardamom cultivation purposes like for food crop and for residential purposes.[19] Consequently, by 1940's a general tendency to encroach upon cardamom hill reserve lands developed among the cardamom ryots in particular and people in general.[20]

One can get an idea about the seriousness of encroachment from the various remarks made regarding it by the senior officials. The Chief Secretary remarked in 1939: "Taking the present state of things into account as well as the circumstances of the locality, the necessity to discourage profiteering and monopolisation, the absence of any hesitation on the part of this state's subjects at present in regard to the exploitation of the lands in question (i.e. Cardamom hill reserves) and, finally, and to a paramount degree, the expediency to lessen the number of large holdings and

to give encouragement to small holders to embark on what has now turned out to be a profitable business. Government can not avoid the conclusion that — those persons who are in possession of any lands in regard to which they got no permission to enter and cultivate the land before registry will be forthwith evicted"[21] The above remark clearly shows that by 1940's certain encroachers who had large holdings had started selling their land for profiteering and monopolisation.

Consequences of granting forest lands for food cultivation:

Since the areas granted for food crop cultivation within CHR were swamp and grass land, no direct deforestation resulted from them. However, there arose two adverse long term consequence from the policy of government to encourage food crops cultivation within dense evergreen forests.

First, since the maximum ceiling on land procurement was in relation to the individual holding, it meant that ryots with larger cardamom holding could acquire larger area for food crops cultivation . Therefore after 1920's when the demand for land had increased considerably the rich cardamom ryots having larger holdings acquired proportionally larger acres for food cultivation. Taking advantage of the increased demand, the rich cardamom ryots started resorting to profiteering and monopolising by selling their large holdings in small segments to the needy ryots, and encroaching fresh areas on cardamom hills.[22]

Secondly, although the rules provided lands only for cereal cultivation, overtime because of the comparative advantage in growing tapioca the ryots started growing tapioca instead of cereal crops on these hilly lands amidst

dense forests. The hilly soils being generally less fertile - the hills have a shallow soil covering with a very erodible thin layer of top soil - they required fallow periods after cultivating cereal crops, while apioca could be grown without keeping the land fallow.

Another added advantage of tapioca cultivation was that it had a higher yield and ready market, as compared to cereal crops, such that the excess quantity produced could be marketed.[23] This resulted in increase in area under tapioca crop within the CHR. However, this process of growing tapioca is not unique to CHR. In other reserve forests also tapioca was cultivated instead of food crops. This increase in area under tapioca in turn led to large scale soil erosion and thereby reduction in yield of cardamom gardens and a general reduction in soil fertility on the hills.[24]

The effect of post World War I period of acute shortage in terms of total land disreserved was not of very great importance. However, like the policy of granting land in CHR this scheme also led to encroachments in forest lands. In the absence of concrete data one can get an idea of the seriousness of this problem from the various government orders issued regarding it.[25]

The maximum encroachments upon forest lands occurred due to the leasing out of forest land for cereal cultivation after World War II. Since the leases were given for short duration their term got over by the end of 1948-49. But by 1948-49 the government took a decision to give all such lands to ex-servicemen. Accordingly, a special officer was appointed to survey the

leased lands in order to carry out such transfers. This officer was also required to "enquire into and find out cases in which it will be hard to evict the original food production lessees in view of the capital investments made by them for improving of and effecting cultivation in the lands leased to them".[26]

The obvious outcome of this change in original plan of reverting the leased lands back was that all the lands leased out till 1948-49 by forest department could never be reclaimed by it. A majority of it was given to ex-servicemen and part of it was retained by such ryots who did not vacate on the grounds of having made modification on them by incurring expenditure.

Another outcome of this scheme was that it caused increase in number of forest offences like encroachment upon forest lands. This outcome was natural due to the sheer fact that people were encouraged to cultivate food on the lands which were within the forest reserves. This fact can be verified by analysing the instances of increase in forest offences due to leasing out of forest lands for food production. For example , the reasons provided for the increase in the number of offences from 1208 in 1947-48 to 1236 in 1948-49 was "mainly due to the larger number of cases booked against food production leases for offences against the Forest Act".[27]

Consequence of increase in Population on the highlands:

A natural consequence of increase in population on the highlands was that the demand for lands for food cultivation and housing purposes increased.[28] This resulted in large scale encroachments on forest lands. This process of

encroachment on forest land was further facilitated by the existence of large network of ghat roads. The mechanism of encroaching forest lands during the growth in area under cardamom and food production had been discussed already. An indirect way of establishing a relation between large scale encroachment on forest lands and increase in population is to see the type and number of forest offences recorded by forest department during the period of our concern.

With the general increase in population overtime, the total number of offences recorded by the forest department also kept on increasing, as is evident from the following table

Table-8: Increase in Number of Offences in Travancore (1899-1942)

Year	Total Number of offences	Index
1899-1900	268	100
1904-05	697	260
1909-10	642	240
1914-15	1029	384
1915-16	1206	450
1924-25	1305	486
1925-26	1362	508
1930-31	1728	645
1935-36	1552	579
1941-42	1366	510

Source: Various issues of ART

Not only did there exist a relation between general rise in population in Travancore and a general increase in forest offences, but there was a

specific association between increase in population on high land and increase in certain type of forest offences on the high lands namely the illicit clearing of government lands (encroachments) and illicit collections from reserves.[29]

In this context Table 9 clearly shows that during the II, III and IV decade of this century the index of increase in population on highlands was comparatively much higher than the first decade and so was the incidence of forest offences, which were largely commited on forested highlands.

This observed relation between increased number of certain type of offences especially encroachments along with rapid increase in population on highlands establishes indirectly the fact that increase in population on highlands had been facilitating the process of encroachments in the Evergreen forests.

In this chapter placing the phenomenon of loss of forest cover and encroachment in the larger context of the dynamics of change in the economy of Travancore we observed that during the period 1890-1947, due to government's own deliberate efforts, there occurred a tremendous increase in area under plantation and food crops on the highlands of Travancore. This increase

Table-9: Trend in Type of Forest Offences (1901-40)

Decade	Population Index (1891 = 100)	Year in which maximum number of offences were recorded	Total Number of offences
1901-10	124	NA	NA
1911-20	162	1912-13	677 (28)
		1915-16	1206 (80)
1921-30	214	1924-25	1305 (78)
		1928-29	1430 (97)
1931-40	414	1930-31	1728(112)
		1938-39	1390(102)

Note : Figures in brackets show incidence of encroachments

Source : Various issues of ART

brought about inmigration of people towards highlands, facilitated by a well developed ghat road network and contributed substantially in increasing population on the hills. All these changes on the highland in turn caused (i) a permanent loss of forest cover and (ii) initiated and perpetuated a phenomenon of large scale encroachment upon forest lands. This trend continued at a faster rate in the post Independence period. The factors that have shaped this trend in the State of Kerala since Independence is analysed in the subsequent chapter.

Notes and References

1. It should be noted at this juncture that the nomenclature used for the division under which these hilly forested districts were placed had been changing in various Census reports of Travancore since the beginning of Census in 1875. Till 1901, these districts were placed under Eastern division. It is for this reason, that in order to show the increase in population in hilly and forested districts up to 1900, we have considered districts falling under Eastern division in the previous chapters. From 1901 to 1921, the nomenclature used for the division comprising these districts was Mountaneous division. From 1931 Census onwards it was changed to Highland division .

2. In Travancore cardamom cultivation was mainly carried out in the forested Taluks of Devicolam, Perrumade and Udambanchola. All the cardamom growing areas in these 3 Taluks are called Nagaraelam tract. Although the Nagaraelam tract commonly used to refer to the cardamom growing areas, in Travancore certain other smaller cardamom growing areas were present. For example, a smaller tract where cardamom was grown situated near Thodupuzha and called Kanniaelam tract. Therefore total cardamom growing forested areas were bigger than Nagaraelam tract and is known as Cardamom Hill Reserve (CHR).

3. See Nagam Aiya, V, (1906) Op.cit, Vol.III

4. As referred earlier, till 1876-77 coffee was the main plantation crop on the hills and within 12 years since 1864-65 (when it was first planted) the acreage under coffee rose almost to 40,000 acres. But initially, a fungal disease attack on the leaves of coffee plants and later, fall in its prices since 1877, forced many European planters to abandon their coffee plantations and they took to tea planting.

5. See Panikar, P.G.K. et al (1978) Population Growth and Agricultural Development -- A Case Study of Kerala, Rome, Food and Agriculture Organisation of the United Nations, p.8

6. See G.O No.4692/R/1874 dated the 21st March 1906, Fifth Supplement to Travancore Land Revenue Manual (TLRM) (1950) Vol.II; p.405

7. Government Order D Dis.No.1039/31, 23rd July 1931 See Fifth Supplement to TLRM (1950) Vol.II; Op.cit.

8. Due to government's own deliberate policies most of the cultivated area in the high lands came under plantation crops. This continuous growth of area under plantation crops led to increased availability of living and working facilities. Moreover, a well developed network of ghat roads led to a steady increase in population on these high lands. The people who settled on highlands depended for their food requirements on the low land markets. Since the cultivation of cash crops was more profitable than food crops even in the low lands, most of the people used to grow cash crops (Mateer, S.(1883) Consequently, by 1880's a situation of food shortage arose in Travancore.

9. See Panikar, P.G.K. et al, (1978) Op.cit., p.16

10. These rules fixed a limit of 5 acres of wet and 20 acres of dry land for an individual ryot. See Second Supplement, TLRM (1929) Vol.II Part II; p.1074

11. Panikar P.G.K. et al, (1978) Op cit. p.198

12. See G.O. Dis No.1197 of 1922 Second Supplement to TLRM, Vol.II Part I; p.662 and 742-745

13. In this context various Administrative reports of Travancore of post 1922 period note under "Forest Policy". "A judicious policy of disafforesting as much suitable lands as practicable for paddy cultivation is being systematically followed" ART (1922); para 47

14. In fact, cardamom can not be grown in any other type of forests or open country as it can not bear drought, direct sunlight and highwinds, especially in the earlier period of its growth.

15. This was due to the fact that all the evergreen forests belonging to CHR were declared as reserve forests under forest regulation of 1892-93 . Therefore all the cardamom growing areas under CHR were reserve forests and the trees on it were under the control of forest department. This meant that though the private ryots cultivating cardamom were the owners of these lands the standing trees belonged to forest department. At the same time since the lands were procured by the ryots from revenue department control over land lay with the revenue department meaning thereby, cardamom growing lands in CHR were under the dual control of forest and revenue department.

16. In the various TLRMs especially after 1930's several instances of confusion and misunderstanding on various questions related to trees on CHR can be noticed. For example See Third Supplement to TLRM Vol.II (1935); p.242

17. Another factor which facilitated easy encroachment of forest lands in CHR was its specific geographic and ecological position. The CHR was nothing but a continuous part of a larger belt of evergreen forests which runs throughout the Western Ghats of Kerala having non-cardamom growing evergreen forest tracts. Thus, there was no apparent physical distinction between cardamom hill reserves and other evergreen forest reserves. Since for cardamom cultivation, unlike other cash crops like tea, coffee and rubber, cutting or felling all the trees to completely clear the area was not required, cardamom growing areas looked more or less like other evergreen forests. It is largely due to this reason that making fresh inroads into the adjacent evergreen forest or into adjacent areas within cardamom hill reserve was much easier for the cardamom growing ryots of cardamom hills.

18. See Nair, et al (1984) Op.cit; p.39

19. Viswanathan T.P. (1978) Brief History of Cardamom Hill Reserve.

20. This fact gets amply corroborated by the remark of the then Chief Secretary to government made in 1939 while rejecting the prayer of granting registry to some encroachment (Regarding the argument made by encroachers) "that the encroachers who had occupied and made improvements on the lands should be allowed to get registry of the land occupied and cultivated - the first point to be remembered is that registry is ex-concessu and wholly optional Rule 5 making it perfectly obvious that the discretion of registry or non registry is vested primarily with Government. The expression 'Public interest' occurring in the rule is to be construed as having relation to time and the state of things when the order was passed. Government consider that this aspect is important in view of the argument advanced on the basis of the language of Rules 2(i), (ii) and (iii) the scheme of rules being ostensibly that occupation without permission would be regarded as a possible element for consideration in addition to entry with permission. After a careful consideration - Government are definitely of the view that squatters who entered upon sirkar land without permission — have absolutely no right, legal or equitable. See Fourth Supplement to TLRM, Vol.II(1942);pp.457-459.

21. Ibid.

22. Vishwanathan, T.R (1978) Op.cit.

23. See Nair, CTS et al. (1984) Op.cit.;p.6

24. This argument has been made by several authors, for example, Nair, CTS, (1984) Op.cit. Vishwanathan, T.P.(1978) Op.cit. Nair, K.N et al(1984) Op.cit.

25. See, for instance, second supplement to the TLRM, Vol.II, Part I, pp.350-51.

26. ART, 1948-49; p.25

27. ART, 1948-49; p.43

28. Census of Travancore (1941) Op.cit.

29. In the department records the forest offences are mainly classified into 4 types: (a) illicit collection and removal of timber or MFP from forests (b) damage and destruction on royal trees (c) illicit clearing of government lands (d) illicit collection from reserve. The offence (c) would be called encroachment in common parlance.

Chapter 5

DELINEATION OF AND ENCROACHMENT ON FOREST LAND IN KERALA (1956-1980)

Since the formation of the present State of Kerala various development projects and welfare schemes launched by the State and her policy of continuing support to cause of plantation and cash crops led to large scale delineation of forest land. Moreover since 1950 and (especially after 1956) due to political support the phenomenon of encroachment became more widespread and resulted in large scale deforestation. As one study revealed that since the reorganisation of State in 1956 till 1973 i.e. within 17 years and extent of 4187.37 square km of forest area was delineated for various purposes. If further suggest that during 1973-84 the process of deforestation continued at a rapid rate of 1 per cent per annum. Therefore even if the rate of deforestation for the above period is presumed as 0.5 per cent per annum the total natural forest area of the State would be only about 9-10 per cent of the total geographical area of the State by 1984.[1/]

In this chapter, we have made an attempt to analyse (a) the factors causing the delineation of forest land and (b) the nature and extent of encroachment on forest land and how it was dealt with by the State. The analysis is divided in to three sections. Section I deals with the

delineation of forest land and in Section II, encroachment on forest land is examined. The official approach towards encroachment is examined in Section III

I

Delineation of Forest Land

A variety of factors have contributed to the large scale delineation of forest land in the present State of Kerala. These factors are (a) developmental projects and welfare schemes of the State and (b) continued growth in area under plantation crops on the hills.

(a) Developmental Projects and Welfare Schemes:

Developmental projects can further be subdivided into (1) large irrigation and hydroelectric or multipurpose river valley projects (2) infrastructural facilities like roads (3) State-owned corporations.

(1) After reorganisation of the State the Government of Kerala developed few major irrigation and multipurpose river valley projects. These projects are constructed by tapping the water resource of major rivers whose source of supply of water is neighbouring forested hills. Though the existence of forests is essential for such projects, the construction of dam, reservoir and accommodations for the temporary settlement of construction workers required clearing of forest land. One estimate put

the total forest area cleared by various river valley projects in the State as 241.40 square kilometers.[2]

(2) The various developmental works in the post-Independence period called for continued expansion of roads and other public works. The construction of roads, especially in the vicinity of impenetrable forest areas have made for forests accessible, thereby increasing the scope for human intervention and consequently to deforestation. A study quantifying the impact of increase in road length on deforestation has observed that there is a very high positive relation between these two. Though this relationship cannot be taken at its face value since it does not reflect causality, it positively indicates that deforestation aggravates with increase in road length especially around the forests.

(iii) Formation of various State Corporations like State Farming Corporation (SFC), Plantation Corporation of Kerala (PCK), Rehabilitation Plantation Limited (RPL) and Oil Palm Indian were started with the objective of fostering the development and marketing of various cash crops. For the development of these various Corporations the forest department had to give forest land from its various divisions. In the case of Oil Palm India the total extent of forest land given was 3705 hectares (from Punalur division); 2528 hectares were given to State Farming Corporation, whereas for the Rehabilitation Plantation Ltd. 2265.218 hectares of forest land was given. Similarly, around 2610 hectares were given to Plantation Corporation of Kerala. It needs to be noted here that by definition,[3] these areas are still considered to be forest areas whereas in actuality these are areas

where plantations are raised by these corporations. In Kerala some of the welfare schemes of the Government had played a direct role in depleting the forest areas of the State. Welfare schemes like resettling repatriates, ex-army personnel, evacuees from project sites, tribals and political sufferers, etc., the government acquired and distributed essentially the forest lands. Total forest land distributed under these welfare schemes was about 20 thousand hectares in the late sixties.[4/]

The total extent of forest land lost due to various developmental projects and welfare schemes in the State is estimated to be about 70 thousand hectares. The distribution of this land for various projects is given in Table 1.

Table-1: Extent of Forest Land used for Development Projects and Welfare Schemes

(in hectares)

Project/Scheme	Forest land utilized
Oil Palm India Ltd.	3700
State Farming Corporation	2500
Rehabilitation Plantation Ltd.	2250
Plantation Corporation of Kerala	2600
River Valley Projects	24150
Various Welfare Schemes	20380
Industrial Purposes	3700

Sources: (i) Statistical Wing of Kerala Forest Department (unpublished data)
(ii) Government of Kerala (1984) Western Ghat Development Programme, Status Paper for area sub group, Trivandrum
(iii) Puri, G.S. et al.(1983)

(b) Increase in area under Plantation Crops

As in the pre-independence period, the development of cash and plantation crops received incentives and impetus from the newly formed state of Kerala. This led to a continued increase in the area under cash and plantation crops, as is evident from Table 2.

Table-2: Area under Plantation Crops (1960-84)

(in '000 hectares)

Year	Rubber	Coffee	Tea
1960-61	122.87	16.80	37.63
1970-71	179.26	31.56	37.59
1980-81	237.71	57.95	36.16
1983-84	271.20	62.37	35.02

Source: Relevant Issues of Statistics for Planning

Though one cannot postulate a direct causal link between growth of area under these plantation crops and deforestation, the fact that all these crops are grown on the once forested high-lands would make it obvious that a large proportion of these areas under cultivation would have been raised after clearing forest land. There is some evidence to this effect in the various working plans formulated for divisions mainly comprising high-lands. However, this causal link can be established very concretely in one specific plantation crop i.e. cardamom. The growth of area under cardamom can be seen from Table 3.

Table-3: Estimated Area under Cardamom Crop (1958-81)

(in '000 hectares)

Year	Area
1958-59	29.8
1959-60	28.5
1960-61	28.6
1961-62	28.6
1977-78	52.0
1978-79	53.2
1979-80	56.1
1980-81	56.3

Source: Nair, K.N. et al.(1984) Op.cit. p.29

As in the pre-Independence period, in the post-Independence period also the degradation and loss of forest cover continued not by the increase in area under cardamom cultivation per se, but by its intensification and consequential encroachment for profit maximisation. The intensification has a special role to play in affecting adversely the productive and regenerative capacities of the evergreen forests.

This is, because for the cultivation of cardamom certain conditions are necessary e.g. shade regulation, weeding, manuring and other cultural practices, etc. Therefore, the intensive cultivation of cardamom necessitates the removal of mid and top storey trees and rendering the evergreen forests ecologically unfit for wood production. The encroachment of forest area which is closely related to the development of cardamom will be highlighted

while discussing the general problem of encroachment in forests.

II

Encroachment on Forests

By far the most severe external factor which has resulted in large scale denudation of forests has been that of ncroachment on forest lands by individuals. The problem of large scale encroachment is mainly a post 1940 phenomenon which has become particularly acute in the period after Independence. The factors leading to encroachment can be classified under two main heads: (i) natural phenomenon like that of population growth (ii) State policies facilitating encroachment

(i) Increase in population growth and migration:

Consequent upon the persistently high rates of growth of population in the State, the pressure on land increased substantially. This is evident from the fact that Kerala has the highest density of population in India[5/] and has been having much above the all India average Intercensal rate of increase in population since the beginning of the century (except during the decade between 1971-1981). With increasing pressure on land, the process of inmigration which had been in existence even in the pre-Independence period gained momentum. The low density forested high lands provided ideal destinations for the migrant. The inmigration into high lands led to encroachments which

was further facilitated by the existence of a well developed road network and liberal policies of the Government to regularise encroachment.

(ii) State Policies facilitating encroachment:

From time to time the State Government itself has been formulating policies for the development of agricultural and allied activities. These have had both direct or indirect impact on the pattern and magnitude of encroachment on forest land.

Historically, the genesis of large scale encroachment which has by and large been confined to the highland areas, in particular the Cardamom Hill Reserve can be traced back to the proclamation of 1942. Vide this proclamation, the State temporarily leased out a maximum of 5 acres of forest land to individuals for cultivation purposes (for details See Chapter 6). This was done in response to the food shortage faced by the State of Travancore during World War II period.[6] Given this initial incentive by the Government to take up cultivation in forest lands on a lease basis, the problem of large scale encroachment was ineffect started in the 1940's and later was strengthened by the lenient attitude of the Government.

The total forest area delineated for settlement of people and regularising encroachment has been estimated by various committees set up by the Government and as mentioned in various Government orders is provided in Table 4.

Table 4 shows that till 1957 approximately 38,000 ha forest land

Table-4: Estimated Total Forest Area Given mainly to Accommodate Settlers and for Food Production to the Revenue Department by the Forest Department

(in hectares)

Recommending Authorities	Area
Soil Erosion Committee (1950)*	12285
A Special Officer (of the rank of District Collector) and a Colonisation Advisory Committee (1954)**	10254
Popular Committees (1957)***	15510

Notes: * This figure relates to the area given to the revenue department from the forest reserves of Trivandrum, Quilon, Shencottah, Konni, Kottayam, Malayattur, Chalakudy and Trichur, on the basis of a Government order issued in June 1951.

** This much non-revertible forest area was given by the FD to the revenue department in October 1956 following the classification made by Government of the forest lands into revertible and non revertible forest lands. On the basis of suggestions by the above Committee through G.O.No.F4-1405/54/RD in 1954

*** This much land was given to the people on the basis of recommendation of the Chief Conservator of Forests which inturn was based on the recommendation of the popular committee.

Source: Karunakaran, C.K.(1984), Op.cit., pp.152,155-157,159-160.

was delineated and given to the revenue department. Further encouraged by the encroachment resulting from the implementation of the above mentioned schemes, the pioneer cardamom growers of Cardamom Hill Reserve, seized the opportunity to encroach into adjoining forest areas. In this process they were facilitated by two factors:

(a) By the differential rules, practices and ceiling limits for the legitimization of cardamom encroachment. Taking advantage of 25 acre limits, encroachments were made into adjacement moist decidous forests in CHR unsuitable for cardamom. Moreover these original encroachers having taken the possession of forest areas transferred their lesse to newcomers for a profit. These newcomers were mostly absentee landlords who sold this land piecemeal to landless cultivators eligible for assignment of land under Kerala Land Assignment Rule. Given the fact that the landless cultivator had to make a living out of this land, it seems plausible to suggest that they felled the standing trees on these lands for the purpose of growing subsistence crops like Tapioca and for cash crops like rubber and pepper.

(b) It might be recalled that the CHR has been under dual control of revenue and forest department. The duality was such that while the land in CHR was under the control of revenue department, the trees were under the forest department.[1] This dual control over the CHR area made the process of encroachment extremely easy. This was because, while the primary responsibility of preventing encroachment rested with the forest department they were

ineffective in discharging this responsibility, since land continued to remain under the control of revenue department. This meant that the forest department could only intervene when the trees were cut. However even this intervention was rendered ineffective as most of the encroachers managed to get pattas from the revenue officials.

Table-5: Intercensal Rates of Population Increase in Kerala (1901-81)

(in %)

Year	Kerala	Travancore	Cochin	Malabar	India
1901-11	11.75	16.2	13.1	7.8	5.73
1911-21	9.16	16.8	6.6	3.2	0.31
1921-31	21.35	27.2	28.1	14.1	11.01
1931-41	16.04	19.1	18.1	11.4	14.22
1941-51	24.76	-	-	-	13.31
1951-61	24.76	-	-	-	21.50
1961-71	25.89	-	-	-	24.50
1971-81	19.29	-	-	-	24.99

Sources: (i) Panikar, P.G.K. et.al(1978), Op.cit.; p.1
(ii) Census of India (1981)

III

Official Approach to Encroachment

The fact that there exists a severe problem of encroachment on forest areas was known to the Government is evident from the constitution of several

committees since 1950. The purpose of these committees was to collect information regarding encroachment (like extent and nature of encroachment) and to provide the methods to solve the problem or reduce its incidence. Even though these committees provide details of encroachment and emphasise the need to evict the encroachers by fixing different cut-off years, these suggestions for eviction remained largely ineffective primarily due to political reasons.

Beginning in 1950 three main committees (1950, 1954 and 1957)[8] were constituted to know the extent of area under food crop cultivation or any other non forestry purposes in and around reserve forests and for suggesting solution to mitigate the problem of encroachment.

In 1954 government announced that no land would be given for food grain production to individuals. Only colonies for habitation and registered co-operatives of farmers would be given such lands as were fit for cultivation. Attempts were also made to classify the already occupied forest lands into revertible and non-revertible categories. The purpose of this was to grant permanent occupany rights in the non-revertable category.[9]

In 1957, Government on the basis of realisation that maximum possible forest land has already been given for agriculture and settlement, notified that any encroachment made after March 1957 would be evicted outright and that such encroachers would not be considered for alloting land when any future scheme of land distribution came up. Thus in order to identify the pre and post April 1957 encroachers and demarcate the boundaries of the former and to evict the latter, popular committees were appointed at the level of

forest ranges in 1957.

In spite of strong realisation in the Government about encroachment, the efforts to carry out evictions remained largely ineffective due to the following reasons. First, even after being alarmed by the 1950 committee about the serious consequences of soil erosion (which had been occurring due to food cultivation by encroachers on the hill slopes) in terms of loss of soil fertility and reduction in retaining capacity of hydroelectric dam's reservoir, the Government decided to transfer 12,285 hectares of land from various forest divisions to revenue department in 1951. Moreso in 1953 the Government ordered that forest department should not exercise any of their rights on the leased out lands. Secondly, in order to stop the agitation of people against reverting back areas to forest department the Government decided to revert only such areas where people have no objection. But during the reversion proceedings people raised objections for all the revertible lands, so that none of the areas could be reclaimed back. Finally, as would be evident that the notification of 1957 explicitly protected all the pre April 1957 encroachers. Moreover this notification further encouraged encroachers to make fresh encroachments on forest lands in the absence of demarcation of boundaries of even most of the pre April 1957 encroachers.

The failure of all these committees and resolution made the Government realise that the whole question of encroachment and its remedial measures had to be reexamined. Accordingly a Forest Protection Committee[10] was set up in 1962 to demarcate the forest boundaries and report the monopoly lease and encroachment within the reserve forest. Further the committee was asked

to recommend a ceiling on the maximum land to be alloted to occupier and the type of relief measures to be taken for the evicted.

The committee gave a detailed report on the type and extent of encroachment in various ranges belonging to different divisions. (See Table 6). As per the report of committee as much as 72,000 hectares of

Table-6: Extent of Area under Encroachment in Various Forest Divisions, 1962

(in hectares)

Division	Land Allotted	Land Occupied	Area Encroached	Area to be Evicted
Trivandrum	1200*	2000*	800	700*
Punalur	2256	2700*	444	400*
Thenmala	726	728	2	20
Ranni	3750	7981	4231	2000
Konni	644	736	92	77
Kottayam	7421	34558	27137	26400
Munnar	3069*	39236	36167	1706**
Kothamangalam	290	661	371	145
Malayatoor	20	74*	54*	14*
Chalakudi	1500*	20000*	500*	600*
Trichur	2000*	50*	50*	45*
Total	22776	94924	72148	32107

Notes: * Estimates

** Cardamom hill areas not included

Source : Karunakaran C.K. (1985), Op.cit., p.201

land were under encroachment in varicus forest divisions excluding area falling under CHR in Munnar district.

The committee categorised the occupier of forest land into five categories: (i) Real leasers and their inheritors. (ii) Those who had purchased the rights from the original leasers several years ago and were holding the land since then. (iii) Those who had purchased the rights from the leasers after the expiry of the lease but before April 1957 (iv) Those who had illegally encroached the land prior to April 1957 and (v) those who had illegally encroached the land after April 1957.

The committee recommended that persons who possessed land in their, native places and now occupy forest land should be evicted no matter to which category they belonged. The others (excluding category v) were to be given land according to preference given to each category in the descending order. It also recommended measures for the resettlment of those who were to be evicted.

However in some of the places the eviction of encroachers as suggested by the committee could not be carried out. Because in those places whatever adhoc measures were tried by the forest department to evict encroachers they all failed largely due to the politically backed people's movement against them. For example in 1963 on the basis of the suggestion of this committee the Government issued an exhaustive order specifying clearly that 1960 is the year after which any type of illegal encroachment should be evicted. This order also elaborately points out the type of encroachments (like encroachment on Cardamom Hill Reserve, encroachment on other forest lands due to undefined electricity and irrigation project

boundaries, etc.) and their method of eviction. The efforts made to implement this order by evicting encroachers met with success at many places. However in some locations like Ayyappancoil, Churali - Kirithode and Kunzhikuzhi etc. due to agitations by people these evictions were to be stopped at the initial stages itself.[11]

During the tenure of the President's Rule in Kerala in 1964 a consultative committee attached to the Kerala Legislature was constituted to examine the various dimensions of encroachment. The consultative committee decided to set up a sub committee with Mathew Maniyangadan as chairman to study encroachment and evictions and recommend permanent long term solution to the problems. According to the direction of the consultative committee the sub committee was to consider the possibility of setting up high powered commission. The sub committee (Maniyangadan Committee) was not in favour of this, it stated that the problems were not due to the inadequacy of expert opinion but due to the failures of the Government to implement the various provisions of the laws and regulations already in existence. The Recommendation of the sub committee was different from that of the Forest Protection Committee (Radhakrishnan Committee). It does not question the need to protect forests and project areas. But if favoured the consideration of the problems of the settlers with equal importance. The committee noted that the Government had encouraged the settlements in the early days. At various periods of time the unauthorised settlements were legalised. The present problems were due

to the policies practiced in the last 20 years.[12]

It further noted that most of the encroachments were prior to 1959. These areas are now well-developed settlements with various public amenities like school, places of workshop, etc. The land has been cultivated, home. made, cash crops grown. If the Government orders from the recommendations of the Forest Protection Committee are implemented 15,000 families would have to be evicted. The main issue is whether these people should be evicted. Though public interests are the first priority the human and social considerations are of equal importance. Thus the Maniyangadan Committee took for itself the work of suggesting to the Government the revertible and non-revertible areas[13] out of total encroached areas in the high lands and CHR. Consequently, as per the recommendation of the Maniyangarden Committee the Government ordered certain areas to be reverted back to forest department. But this time also due to mostly politically supported protest and agitations by people against forest department's efforts to carry out such reversion through eviction, hardly any area was reverted back to the forest department. Similarly several other committees were formed on the question of encroachment even after the Maniyangadan Committee[14] but till date the forest department could not take back more than a few hundred hectares of area here and there by evictions through implementing the recommendations of these committees due to political protest.

The result of such a characteristic situation wherein the problem of encroachment and its intensity is recognised and steps being taken to find

out a solution by the Government, due to social and political reasons evictions were never been effectively made. Consequently over the years, encroachment of forest land has become a part of commonman's life and is not generally taken as a serious issue.

Every now and then official statements are made to highlight the problem of encroachment but in general they do not cause any serious reaction among the public. In one of the latest public speeches, the present minister of forests alleged that till date about 80,000 acres (i.e. 31500 ha) of forest land has been encroached and approximately 40,000 families were living on them. However, due to two reasons it can be safely presumed that this official figure is an underestimation. First, due to dual control system prevailing in CHR (one of the most important location of encroachments in Kerala) the forest department of Kerala has so far not been able to know the exact extent of encroachments in CHR.[16] Secondly, even the known extent of encroachment within CHR(which mainly falls under Kottayam forest division) which was more than 26,000 hectares by 1962 (See Table 7) and which was officially agreed to be reverted to forest department was not restored completely to the forest department.

Out of the 26,000 hectares of encroached area in CHR, about 8,500 hectares (mainly belonging to Ayyappancoil and Nagrampara Ranges of Kottayam forest division) was never been evicted and brought back to forest department. In addition to this, about 700 hectares of encroached area in non CHR forest lands and about 1000 hectares, encroached area surrounding

various project sites (like Idukki, Kallar, Neriamangalam and Perinchankutty projects) and game sanctuaries (like Periyar and Peechi) could not be evicted and reclaimed back to forest department.[17] Evidently it is clear that there may be more than ten thousand hectares of encroached area which is officially categorised as forest land but in reality is still under encroachment.

Thus we have observed that, as in the pre-Independence period, the area under plantation crops increased greatly at the expense of forest lands. Apart from this old delineating factor, new forces like developmental projects and welfare schemes also delineated a large chunck of forest area. A natural effect of these delineating factors under conditions of high population growth and political support was that it transformed the phenomenon of encroachment to an integrated process of deforesting and illegally possessing large chunks of forest lands by professional profit seekers and organised groups. At the same time even in the remaining forest areas, depletion of forest resources has been taking place at a faster rate. The factors responsible for this process are analysed in the following chapter.

Notes and References

1. Chattopadhyoy, Srikumar. 'Deforestation in Parts of Western Ghats Region (Kerala), India. Journal of Environmental Management, Vol.20(1985); p.223.

2. Chattopadhyay, Srikumar (1985), Op.cit., p.227

3. Since none of these areas have so far been disreserved, they are still classified as reserve forest in the documents of forest department as the areas are temporarily leased out to these corporations.

4. Vishwanathan, T.P.(1978a) Brief History of Cardamom Hill Reserves pp.5-6

5. See Panikar, P.G.K. et al.(1978), Op.cit. Table 1.3, p.4

6. See for details regarding the recurrent regularisation on ncroachment Nair, K.N. (1984), Op.cit.pp.44-45

7. See, for details, Chapter IV

8. (a) In July 1950, a committee named "Anti Erosion Committee" was set up to make a detailed report on the forest lands used for food production (vide Government Order No.G.P.F. 1.9929/50/DD)

   (b) In 1954, a special officer of District Collector rank was appointed to survey the occupied lands at Peermade, Devicolam and Thalapilly Taluks.

   (c) In April 1957 popular committees were formed at forest range level (vide Government Order No.GPF Az-10183/57/AD.)

   Source: Karunakaran C.K.(1985), Op.cit; pp.152, 157-159

9. For the purpose of surveying the occupied lands to classify them into the two categories along with the Special Officer a Colonisation Advisory Committee was set up in 1954 (Vide Government Order No.GPF 4.405/54).

10. This committee is also known as Radhakrishna Menon Committee. The constitution of this committee was as follows:

> K.P. Radhakrishna Menon IAS - Chairman
> K.A. Velayudhan, K.M. Chandy, M. Vasudeva Pillai and M.M. Ismail (all non official members). P. Govinda Menon, Conservator of Forests, E.V. Philipose, Superintending Engineer, Kerala State Electricity Board. (Vide G.O.(MS)799/62/Agri.)

11. See Vishwanathan, T.P. (1978b) A Note on the History of Occupation in Forest (an unpublished manuscript)

12. Majority of the member of this committee held that the tremendous increase in population and consequent unemployment along with the policy of successively regularising encroachments accelerated the encroachment of forests. Most of the leases were for 20 years. As it was not profitable to cultivate paddy and cereals for more than 3 to 4 years the farmers raised coconuts, pepper, rubber etc. on these leased lands. The land was distributed without surveying and identifying its boundaries. This led to various corrupt practices and large amounts of land were cornered by various people who sold the land to poor farmers in small holdings. The real encroachers thus went away after pocketing the money.

13. As evident by the name revertible areas were to be those areas which had sufficient forest cover and therefore can be maintained as forest land by forest department and thus could be reverted to the forest department. While those areas which were divested of tree cover to be considered as non revertible.

14. See for details Karunakaran, C.K (1985) Op.cit.

15. See Mathrubhumi (Malayalam daily) dated August 27, 1986; p.5

16. This fact is known to the author from personal experience and through his discussion with several senior forest official with Shri T.P. Vishwanathan, a retired forest official who has extensively written on the encroachments in CHR on the basis of his own service experience.

17. See Vishwanathan, T.P.(1978), Op.cit. p.7-10

Chapter 6

TRADITIONAL FORESTRY SCHEMES AND THEIR IMPACT ON THE FOREST ECONOMY OF KERALA (1956-1980)

Since the formation of the present State of Kerala, she adopted the National Foresty Policy as the guideline for the management of her forests. This resulted in the State directly following the Central schemes which were basically of two types (a) Traditional forestry schemes and (b) Non-traditional forestry schemes. Traditional forestry schemes refer to those centrally sponsored schemes which were carried out within the reserve forest area. These were primarily formulated to achieve the targets like increasing economic worth of the forests, enhancing their per unit yield and making forest produce industry oriented. The non traditional forestry mainly consisted of the social forestry schemes.

Since the concern of the present study is the developments within the reserve forests, we shall confine our analysis to the traditional forestry schemes. The content of the schemes implemented under traditional forestry gave emphasis to the following;(a) raising fast growing species, like eucalyptus and industry oriented species, like soft wood (b) raising high valued species like Teak, (c) intensification and extraction of wood raw material from the existing forests. The manner in which these schemes

were implemented, their progress overtime and how such schemes conditioned the conservation and utilization of forest resource of Kerala, are the main focus of this chapter. The analysis is presented in two sections. Section I outlines the various developmental schemes and its implementation. The impact of these schemes on the forest economy of the State is examined in Section 2.

I

Development Schemes and its Progress

After independence the Union Government encouraged raising soft wood plantations (like Elavu) and other fast growing industry oriented species. The first step in this direction was the reconstitution of the Central Advisory Board of Forest Utilisation (CABFU) in May 1947. The principal task of the Board was to secure effective liasion between forest research and industry. This Board consistently highlighted the need to raise plantation for catering to different wood based industries.[1/]

The scheme for Soft wood and Quick Growing Species:

In order to increase the per hectare yield and to meet the requirement of the various wood based industries along with increasing the economic worth of forest, the schemes implemented in the state gave emphasis to the raising of artificial plantations and intensifications of selection felling of timber. The progress of these schemes since the Second Five Year Plan is briefly outlined below. The shift in emphasis to fast growing species gathered

momentum, with the introduction of large scale Eucalyptus plantation since 1960. Initially to test the potentiality of Eucalyptus plantations it was raised experimentally in 1959 in the high lands of Kerala. This was done under the grass land afforestation scheme. The success of these experiments[2] led to raising of large scale Eucalyptus plantation under the scheme. Between 1959 and 1967, 7942 hectares of Eucalyptus plantations were raised by the grassland afforestation division at Pamba.[3] From 1964 onwards Eucalyptus plantations were raised under the four newly created special industrial plantation divisions to meet the demands of the paper and pulp industry.[4] Starting from 1961, under the fuelwood plantation scheme, it was mainly Eucalyptus plantation which was raised. In 1965 a separate circle called industrial plantation circle was formed by uniting the different special divisions which were mainly involved in raising Eucalyptus plantations.[5]

The schemes mentioned above namely softwood, quick growing species and fuelwood schemes were continued over the years under the various plans. The expenditure incurred on those schemes has also increased over time (See Table 1 and also Graph 1)

The obvious result of the increasing expenditure on these schemes was the continuous increase in area under softwood, quick growing and fuelwood species. This can be seen from Table 2 and Graph 2.

Table-1: Plan-wise Expenditure on Plantation Schemes

(in Rs. lakhs)

Schemes	2nd Plan	3rd Plan	Annual Plans	4th Plan	5th Plan	Annual Plans	6th Plan
Soft Wood	7.50	14.60 (22.10)	10.62 (32.72)	14.07 (46.79)	22.76 (69.55)	8.38 (77.93)	21.98 (99.91)
Quick growing species	3.70	68.37 (69.07)	88.20 (157.27)	98.03 (255.30)	86.51 (341.81)	28.43 (370.24)	60.99 (431.23)
Fuelwood species	-	2.03	12.09 (14.12)	2.06 (16.18)	19.02 (35.20)	0.56 (35.76)	7.01 (42.77)
All Plantation Schemes	16.41	141.49	154.88	183.91	234.43	79.72	313.26
Total departmental Plan Scheme	51.35	209.37	241.15	312.05	532.60	354.84	1906.10

Note: Figures in brackets show the cumulative expenditure till that plan

Source: (i) Kerala Forest Statistics, (1977-78), Trivandrum, Kerala Forest Department

(ii) Various Issues of ART pertaining to VI Plan

Graph 1

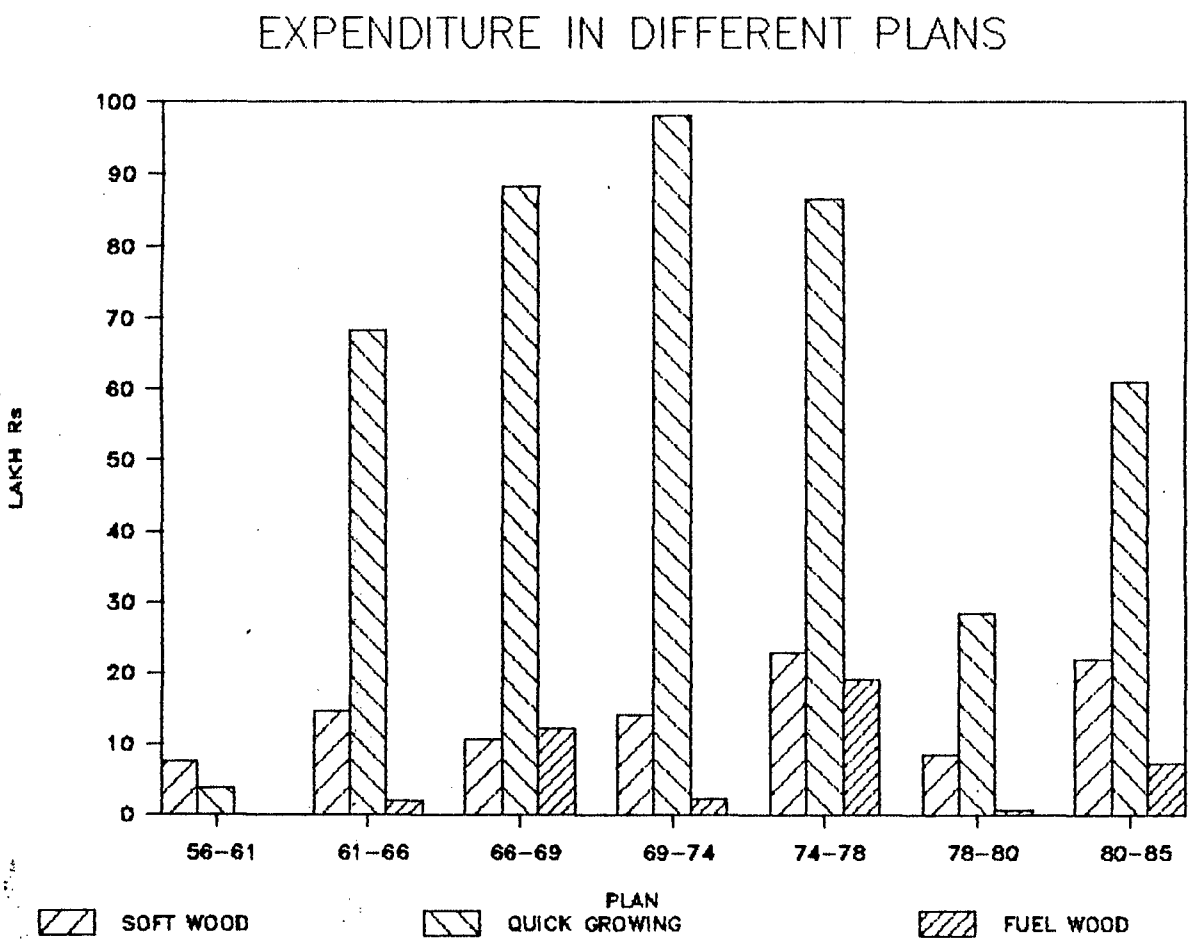

EXPENDITURE IN DIFFERENT PLANS
LAKH Rs
100
90
80
70
60
50
40
30
20
10
0
56-61
61-66
66-69
69-74
74-78
78-80
80-85
PLAN
SOFT WOOD
QUICK GROWING
FUEL WOOD

Table-2: Area under Plantations during various Plans

(in hectares)

Schemes	2nd Plan	3rd Plan	Annual Plans	4th Plan	5th Plan	Annual Plans	6th Plan
Softwood Species	3529	6163 (9692)	3561 (13253)	3333 (16586)	3157 (19743)	1468 (21211)	2021 (23232)
Quick Growing Species	272	8045 (8317)	9231 (17548)	6324 (23872)	1753 (25625)	1863 (27488)	4130 (31618)
Fuelwood	-	345	2010 (2355)	596 (2951)	1753 (4704)	663 (5367)	571 (5938)
All Plantations	6815	27608	21874	17854	16422	11208	18695

Note: Figures in brackets represent the cumulative area upto that plan

Sources: (i) Kerala Forest Statistics, (1977-78), Op.cit.
(ii) Various Administrative Reports of Kerala

Economically Important Species Plantation Schemes:

The possibility of assured success of Teak plantations enabled the State Forest Department to utilise almost all the centrally alloted funds in different plans and achieve the necessary physical targets. Thus in Kerala, the State Forest Department started increasing its annual Teak planting targets by:

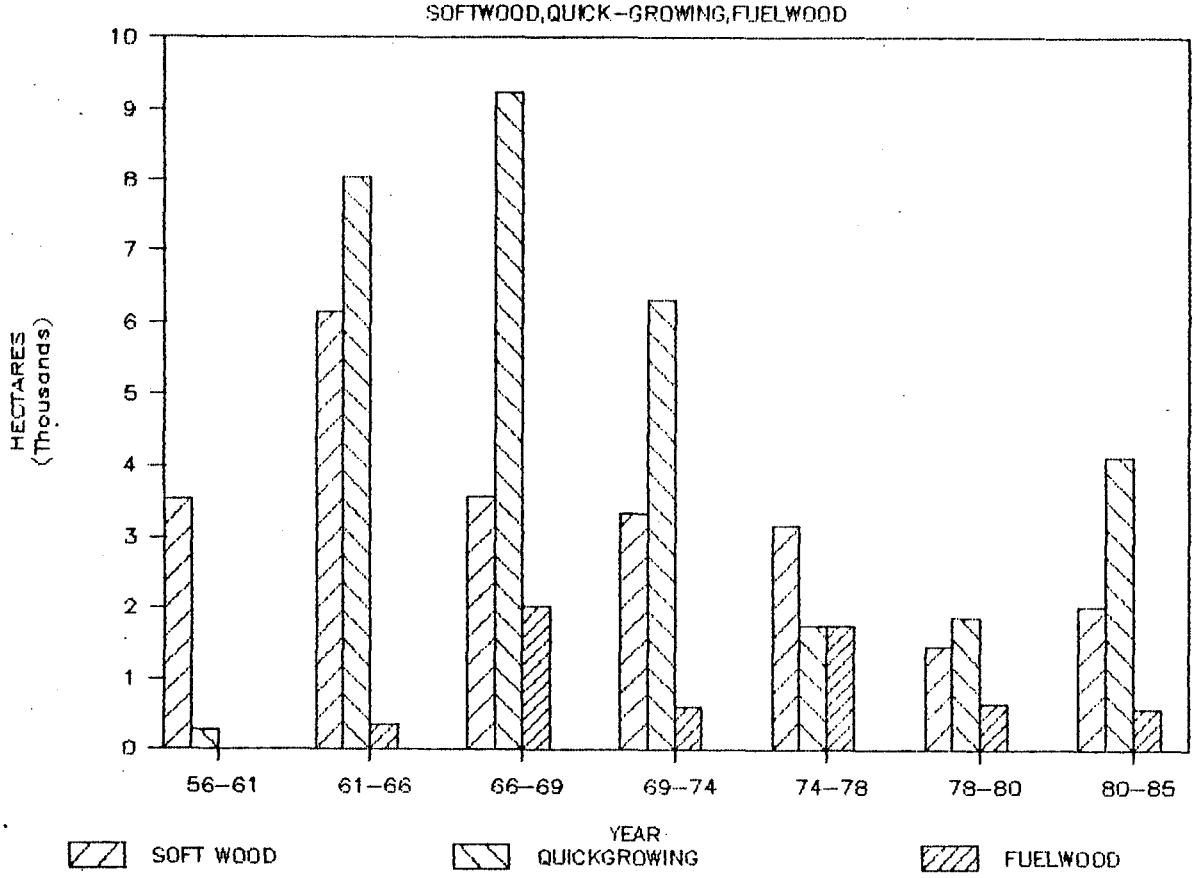
(i) Increasing the targets of original working plans and;

(ii) Formulating new working plans with larger targets

Graph 2a

AREA PLANTED IN EACH PLAN

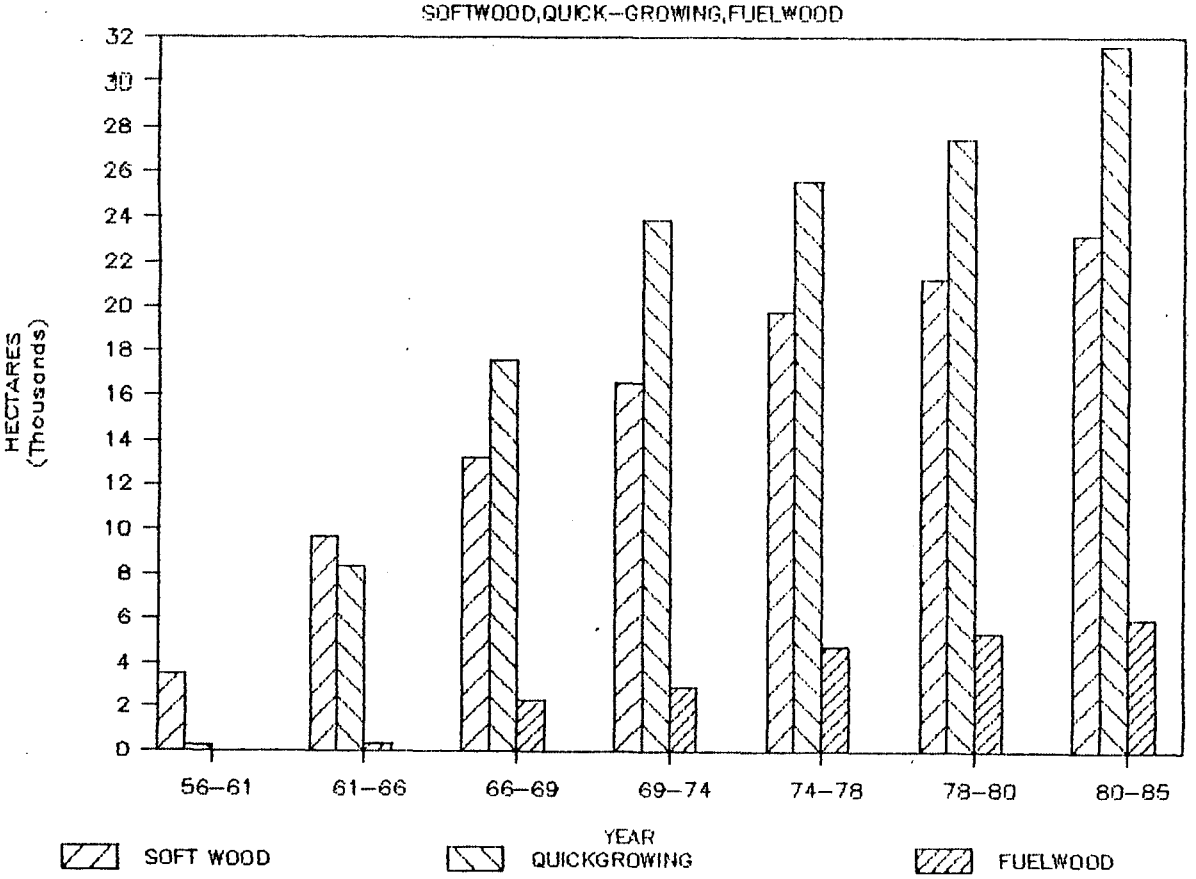
SOFTWOOD,QUICK-GROWING,FUELWOOD



Graph 2b

TOTAL AREA PLANTED AT END OF EACH PLAN

SOFTWOOD,QUICK-GROWING,FUELWOOD



To facilitate the achievement of increased targets for teak plantations the State Forest Department started three special divisions exclusively for raising teak plantations. Further, in order to achieve these targets the practice of planting Teak under Taungya system was more strongly encouraged. This method of leasing out forest land for Taungya Teak planting not only enables more areas to be planted but also reduces the expenditure on per hectare cost of planting and ensures higher survival rate of seedlings.[1/] Accordingly much larger areas were leased as Taungya contracts. With the increase in the extent of forest land given to Taungya cultivation there occurred a change in the type of crops grown by the lessee. The subsistence crop, like paddy, grown previously by small contractors for their living was replaced by commercial cultivation of marketable commodities like tapioca.

Due to these factors the Kerala Forest Department could continue the Teak Plantation schemes successfully. The total expenditure made on the teak plantations under the economically important species growing schemes over the various plans clearly brings out the importance given to Teak plantations (See Table 3 and Graph 3).

With the increase in investment, the area under teak plantations in each plan increased even at a faster rate than other plantations. (See Table 4 and Graph 4).

Table-3: Expenditure on Teak Plantation under Various Plans

(in Rs.lakh)

Schemes	2nd Plan	3rd Plan	Annual Plans	4th Plan	5th Plan	Annual Plans	6th Plan
Teak Plantation	5.41 (32.47)	54.83 (38.75)	43.71 (28.22)	67.76 (36.84)	95.54 (40.75)	25.86 (32.43)	80.57 (25.7)
All Plantation Schemes	16.41	141.49	154.88	183.91	234.43	79.72	313.26
All Plan Schemes	51.35	209.37	241.15	312.05	532.60	354.84	1906.1

Note: Figures in brackets represent percentages of total expenditure on all plantations. Underlined figures shows the cumulative expenditure till that plan.

Source: (i) Kerala Forest Statistics, 1977-78 Op.cit.

(ii) Relevant Administrative Reports of Forest Department

Table-4: Area under Teak Plantations during Various Plans

(in Hectares)

Schemes	2nd Plan	3rd Plan	Annual Plans	4th Plan	5th Plan	Annual Plans	6th Plan
Teak Plantation	3014 (44.22)	12303 (44.56)	6327 (28.92)	7601 (42.57)	8334 (50.74)	6114 (54.55)	6114 (32.70)
		15317	21644	29245	37579	43693	49807
All Plantations	6815	27608	21874	17854	16422	11208	18695

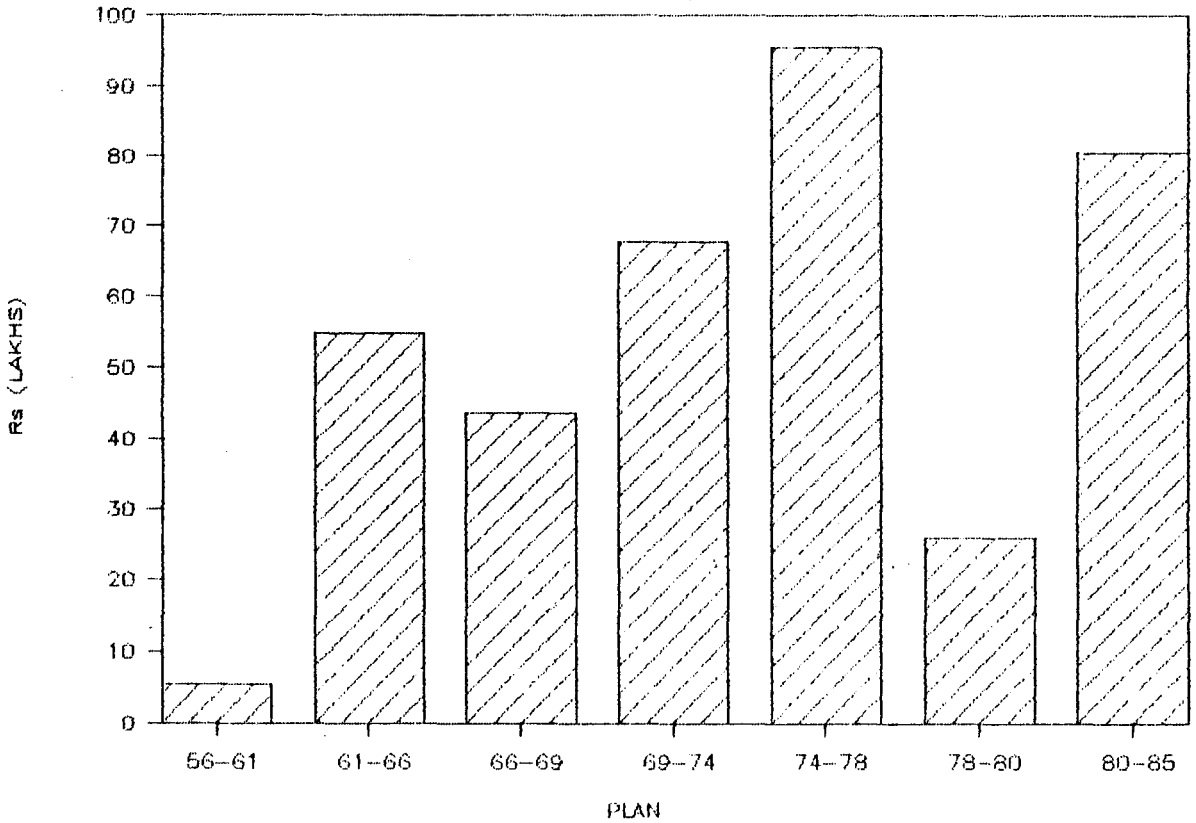
Note: Figures in brackets represent percentages of total plantation grown, underlined figures represent the cumulative area till that plan period

Source: (i) Kerala Forest Statistics, (1976-77) Op.cit.
(ii) Various issues of ART pertaining to VI Plan

Graph 3

EXPENDITURE ON TEAK

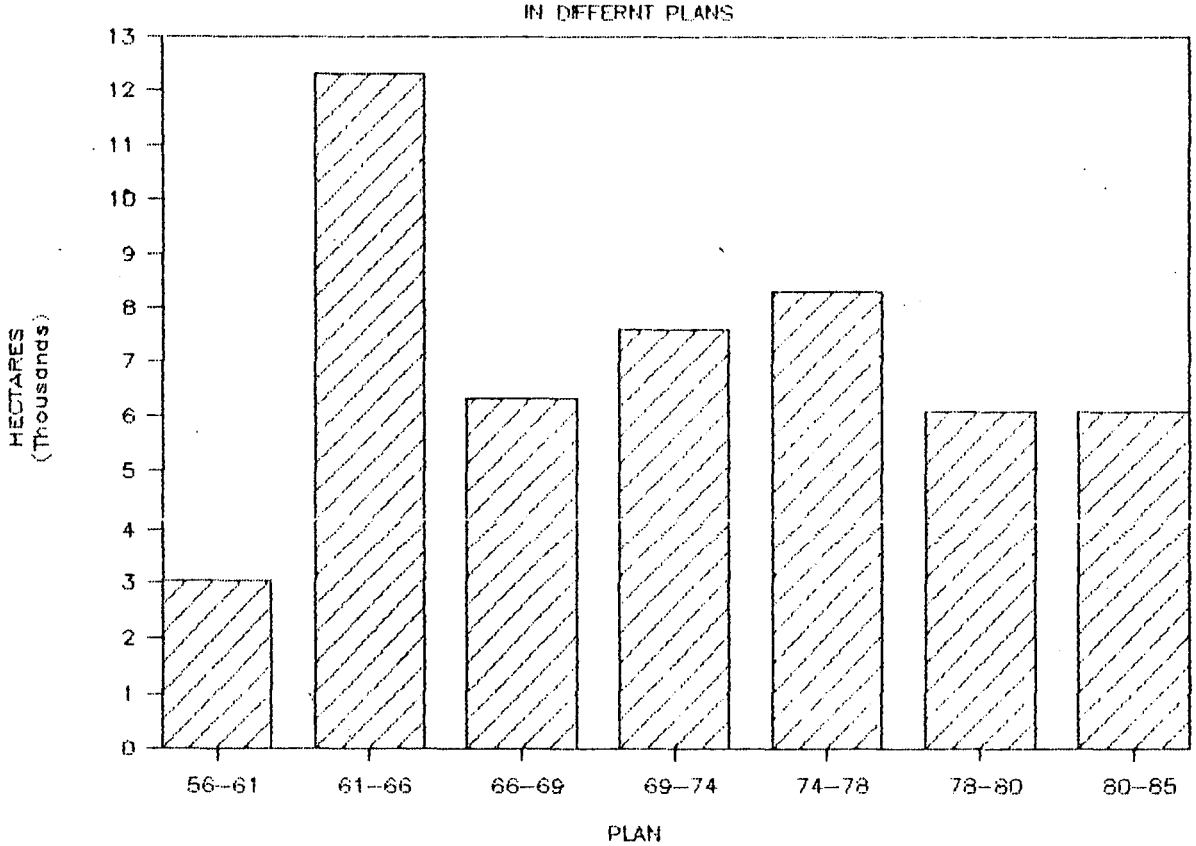
IN DIFFERNT PLANS



Graph 4

TEAK : AREA PLANTED

IN DIFFERNT PLANS



Intensification of selection felling:

The emphasis on increasing wood raw material for wood based industries sharply changed the mode of selection felling in evergreen and semievergreen forests in the State. In the pre-Independence period the demand for softwoods was quite low, due to lack of development of softwood using industries. For example, during this period the industries manufacturing pencils, bobbins, plywood packing cases either did not exist, or were very less in number.[8] Therefore the felling in evergreen and semi evergreen forests by selection felling method used to be of low intensity. However in the post-Independence period, with the growth of wood based industries the need to increase wood production (especially softwoods) has increased (Refer Table 5)

Table-5: Growth of Wood-based Industry in Kerala (1957-82)

Year	Saw Mills	Plywood Splint and Veneers	Matchwood	Others
1957	87	97	19	34
1961	167	13*	96**	47
1971	318	169	35	58
1981	1071	475	139	NA
1982	1248	517	145	NA

Notes: * Only Plywood
** Includes splint and Veneers

Sources: Government of Kerala, Statistics for Planning, 1983
Various Issues of Economic Review, Kerala.

In order to meet this increased demand, the low intensity selection felling gave way to high intensity selection felling. This meant that the number of trees to be cut per hectare increased and the minimum girth at which the trees were felled was lowered in the working plans of various forest divisions by forest department. For example, till 1960, the working plans arbitrarily prescribed the number of trees to be felled per hectare as 8 to 12 trees. But one finds that working plans formulated after 1960's generally[9] prescribe felling of more than 12 trees per hectare. Similarly the minimum exploitable girth for felling the trees was also reduced after 1960.[10]

An important infrastructural facility required to increase the coverage of selection felling of timber is the communication network especially the roads for reaching upto the hitherto inaccessible forests. Consequently the forest department has been spending money on the improvement of communication within the forests (See Table 6).

Table-6: State Expenditure on Communications during Various Plans

(in Rs. lakhs)

Plans	Expenditure
2nd	11.37
3rd	13.52
Annual	25.32
4th	8.78
5th	19.64
Annual	24.42
6th	62.15

Source: Kerala Forest Statistics, 1977-78, Table 28.

The forest department utilised a major portion of its expenditure on communications, for construction and improvement of roads.[11] The result was that hitherto inaccessible forests were made accessible and the work of extraction of industrial wood from such forests was made easier.

This meant that over the years the forests which were once placed under protection working circle due to inaccessibility were transfered to selection working circle with the increased accessibility. Consequently, the area under selection felling has increased overtime in most of the forest divisions of the state. For example, the area under selection felling in Ranni division[12] has increased from 461 hectares in 1975-76 to 1276 hectares in 1980-81.

Formation of Forest Development Corporation (KFDC):

In addition to the efforts made by the Kerala Forest Department, the State Forest Development Corporation has also been involved in the raising of other industry oriented plantations especially Eucalyptus. The targets proposed to be achieved by the corporation under its various projects work were (i) to raise 45,100 hectares of new Eucalyptus plantation and (ii) to acquire 23,680 hectares of old Eucalyptus plantation from forest department. The trees were to be cut after 10 years i.e. rotation was fixed as 10 years, and were to be supplied mainly to Hindustan Paper Corporation (HPC). The contract made with HPC[13] by the Government of Kerala was to supply 1,50,000 metric tonnes Eucalyptus Wood (pulpwood) at fifty per cent moisture content annually for 30 years from the date of execution

of the agreement.[14] In accordance with the State policy of encouraging industrial development the government agreed to supply the raw material from KFDC's plantations on very favourable terms and conditions. For example, the government agreed to supply Eucalyptus to HPC from the plantations raised and acquired by KFDC at the rate of Rs.11 per tonne, when the ongoing rate of Eucalyptus was about Rs.200 per tonne.[15]

From the available data it could be seen that most of the objectives and targets of this pulpwood project were not achieved and it seems quite unlikely that they will be achieved in future also. For example, out of the proposed 45,100 hectares of Eucalyptus plantations to be raised within first 10 years of the project, the KFDC had raised till 1984 i.e. till 8th year of the project, only 8,673 hectares of pulpwood plantations.[16]

Further against a 60-80 metric tonnes per hectare proposed yield from Eucalyptus plantation, the KFDC Eucalyptus plantation at best yield 45-50 metric tonnes per hectare in certain areas.[17] Till the year 1986, which was the 10th year of KFDC's pulpwood project, no supplies were made to H.P.C. the industry for which the project was be started.[18]

II

Impact on Natrual Forests

The modus operandi adopted for raising large scale plantations by Kerala Forest Department was to plant the proposed tree species by clear

felling the existing natural moist and dry mixed deciduous forests of the state. Due to the efforts made by Forest Department as well as KFDC, the total area under plantation of various species increased from approximately 31822 hectares in 1957 to 155162 hectares by 1982.[19] Out of the total area of man made forests, about 59 per cent belongs to Teak plantation, 15 per cent to softwood (combination of Elavu and Teak) and about 25 per cent to Eucalyptus plantation (Quick growing species). Evidently, these three species account for 90 per cent of the man made forests in Kerala. Since these large scale plantations were raised by cutting the mixed deciduous natural forests, the quantity of wood extracted overtime has also increased considerably (See Table 7 and Graph 5). This increase in output of major wood products naturally led to increase in revenue earnings of forest department. It can be seen from Table 8 and Graph 6 that the increase in revenue was stupendous during post Independence period. Since the objectives of increasing the area under artificial plantations and revenue were achieved it is interesting to examine the long term implications of these schemes from the point of view of financial and social cost benefit analysis.

From the standpoint of financial analysis raising of plantations in general and Teak in particular has been beneficial. The main cost involved is labour alongwith land.[20] The main benefits accruable from plantations are timber and other allied products like fuelwood, small timber, poles etc. Most of the timber and fuelwood is obtained at the time of final cutting; the poles and small timber is being obtained at fixed

Graph 5

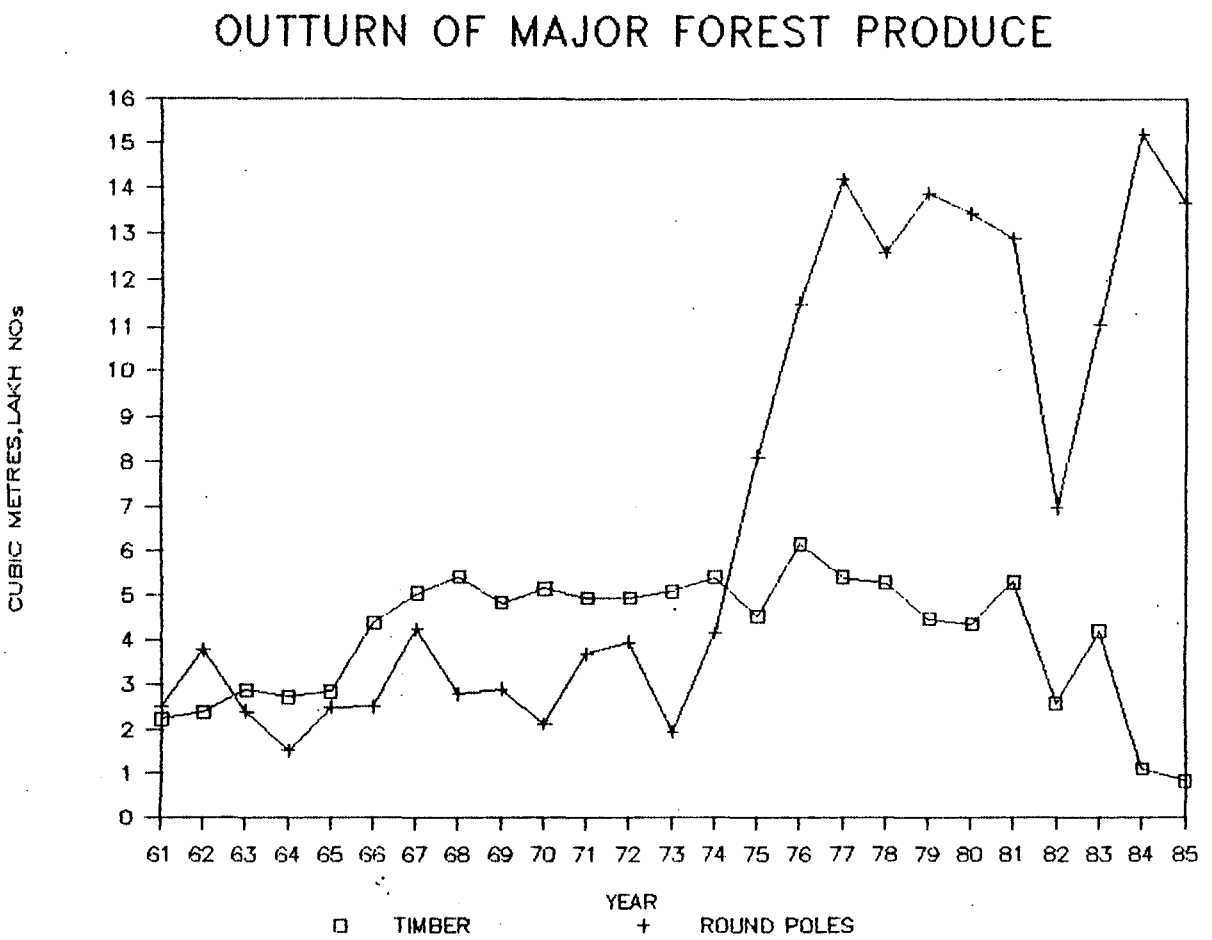

OUTTURN OF MAJOR FOREST PRODUCE
CUBIC METRES, LAKH NOs
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85
YEAR
TIMBER
ROUND POLES

Table-7: Outturn of Timber in Kerala (1960-85)

Year	Timber (in lakh cubic metre*)	Timber (in round poles in lakh No.)
1960-61	2.23	2.52
1961-62	2.38	3.77
1962-63	2.88	2.41
1963-64	2.72	1.53
1964-65	2.85	2.50
1965-66	4.38	2.51
1966-67	5.04	4.23
1967-68	5.41	2.79
1968-69	4.83	2.89
1969-70	5.15	2.12
1970-71	4.94	3.68
1971-72	4.94	3.94
1972-73	5.09	1.94
1973-74	5.41	4.14
1974-75	4.52	8.12
1975-76	6.16	11.49
1976-77	5.41	14.17
1977-78	5.29	12.58
1978-79	4.47	13.87
1979-80	4.34	13.44
1980-81	5.30	12.89
1981-82	2.56	6.96
1982-83	4.19	11.02
1983-84	1.11	15.19
1984-85	0.82	13.66

Note: *Includes softwood felled through selection felling for Industrial softwood production

Source: (i) Kerala Forest Statistics, 1977-78, KFD, 1982
(ii) Relevant Administrative Reports of Kerala Forest Department.

Table-8: Forest Revenue in Kerala (1960-85)

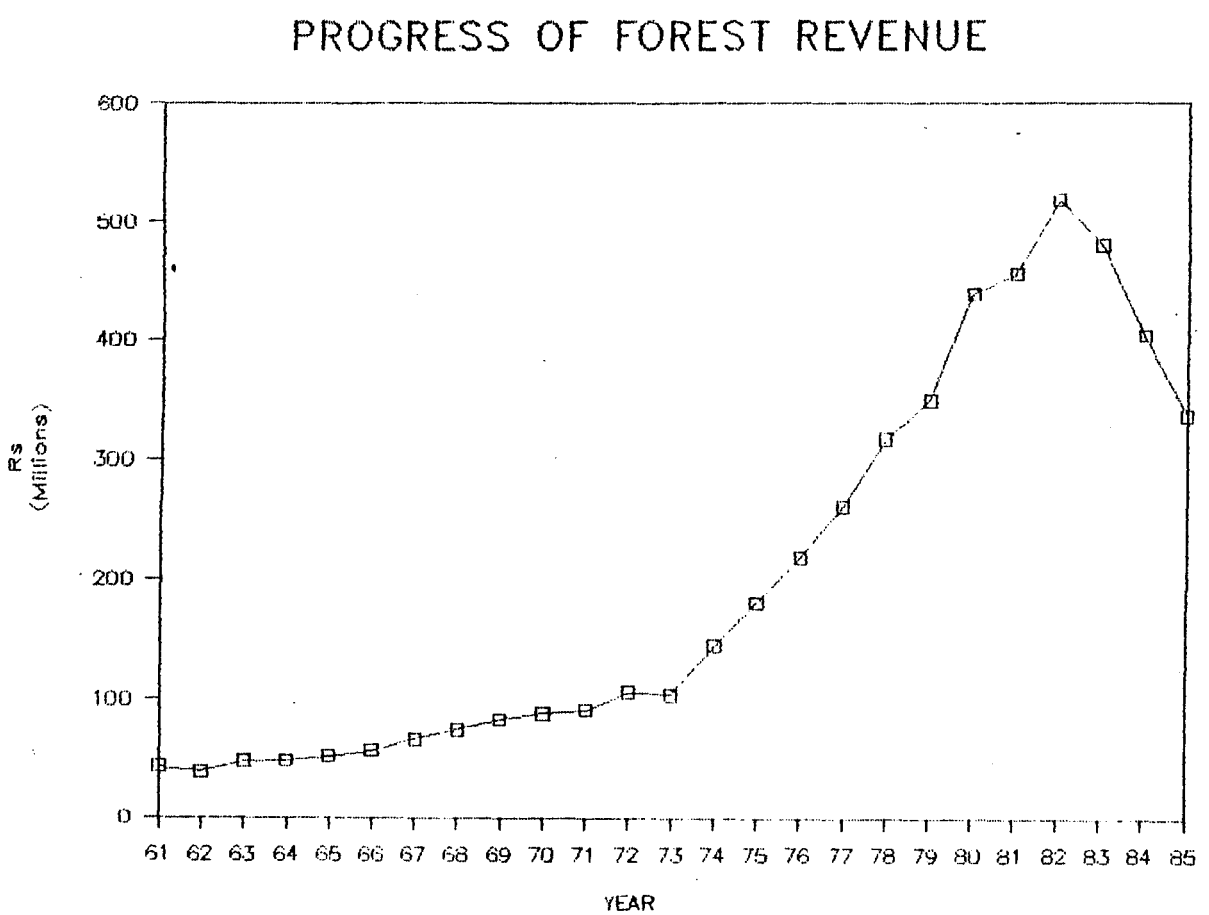
(in Rs.lakhs)

Year	Forest Revenue*	Index of Growth
1960-61	431.94	100
1961-62	392.50	91
1962-63	480.13	111
1963-64	483.77	112
1964-65	523.66	121
1965-66	570.44	132
1966-67	665.60	154
1967-68	744.27	172
1968-69	828.49	192
1969-70	882.89	204
1970-71	914.12	212
1971-72	1061.11	246
1972-73	1045.88	242
1973-74	1453.64	337
1974-75	1817.07	421
1975-76	2192.07	507
1976-77	2617.75	606
1977-78	3178.36	736
1978-79	3506.00	813
1979-80	4401.00	1021
1980-81	4573.00	1061
1981-82	5192.00	1204
1982-83	4818.00	1117
1983-84	4053.00	940
1984-85	3381.00	784

Note: *Includes revenue from minor forest produce

Source: Kerala Forest Statistics, 1982. Relevant Issues of Administration Reports of Kerala Forest Department

Graph 6


PROGRESS OF FOREST REVENUE
600
500
400
300
200
100
0
Rs
(Millions)
61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85
YEAR

intervals when thinning is undertaken.[21] In addition to the aforesaid benefits, two other benefits of raising plantation are employment generation and incidental revenue in terms of Taungya lease rent.[24]

It would be obvious that out of these benefits it is not possible to provide a quantitative estimation of the additional employment generation resulting from raising of large scale plantation. One can only make qualitative statements about these plantations by comparing the costs involved with all the benefits accrued except employment generation. For example on imparting monetary values (at 1982 prices) to the various yields obtained in different years during the 70 years rotation period of a teak plantation raised in Konni division the following results were obtained:

Table-9: Net Income from Teak Plantations

(in Rs. per hectare)

Years		Operation	Cost*	Income	Net Income
4	I	Mechanical thinning	150.00	256.00	106.00
8	II	Mechanical thinning	300.00	2610.00	2310.00
13	I	Silvicultural thinning	650.00	4820.00	4170.00
20	II	Silvicultural thinning	1000.00	8940.00	7940.00
30	III	Silvicultural thinning	1400.00	13280.00	11880.00
44	IV	Silvicultural thinning	1600.00	26320.00	24720.00
70		Final Felling	12450.00	31730.00	304850.00

Note: * The cost includes (a) the cost of felling and conversion into logs, poles and billets, and (b) Opportunity cost which is taken as Rs.650/ha.

Source: Nair, C.T.S. et.al.(1984), Op.cit; Table 6.8, p.130

Table-9 clearly shows that net income at current prices is quite high from the teak plantations. If the income generated through Taungya lease is also taken into account then the net income at current prices would increase further. Taking the net income at discounted value also shows positive results in the case of Teak plantations. But if one looks at the various schemes through social cost and benefit angle, these schemes appear quite unfavourable to the society at large. A social cost-benefit analysis of forestry schemes requires, "(i) estimation of the social value of measurable costs and benefits and (ii) quantification and evaluation of changes in non wood products and benefits. Incidence of costs and benefits among different socio-economic strata of the population also needs to be estimated and appropriate weights have to be assigned.[22]

For the purpose of our study highlighting of major social costs and benefits would be sufficient to appreciate our argument. As a social cost to the society, these schemes resulted in depleting the extent of mixed deciduous forest cover. While in the case of semi evergreen and evergreen forests the process of intensifying selection felling by neglecting ecologically sound intensive multiple use management of forests has led to its transformation from protection to selection and then to conversion working circle.[23]

Consequent upon the raising of plantation and hence reduction in natural forest areas one observes a distinct shift in the product composition of the forest', from a multispecies forests ecosystem to monospecies plantations. Because of this product shift the pattern of availability forest produce in future would change. For instance, raising large scale plantation

(of teak, Eucalyptus or Elavu) entails clearfelling of the natural forests (mixed deciduous, evergreen, semievergreen containing timber species commonly used like Anjili, Jack, Maruthy etc.) Though this has supplied to the market a large quantity of common construction timber, the future supply of this species of timber would get drastically reduced due to loss of their source itself. Further this product shift has reduced the availability of minor forest produce like Honey, Wax, Lac, Rattan, Cane etc. as these are the natural associate of mixed deciduous forest trees. This method of utilising an important resource like Evergreen forests (which are currently considered as non-renewable resources)[24] has definitely a great cost on society.

While analysing the incidential economic benefits of raising of large scale plantations we mentioned about the intensification of Taungya[25] system. On the cost side, as a result of intensification of the Taungya system there occurred a shift in the existing cropping pattern such that instead of mainly subsistence crop like paddy, the Taungyadar's have started growing marketable commodities like tapioca. This in turn led to an increased incidence of soil erosion.[26]

The increased intensity of wood production in evergreen and semi-evergreen forests which were originally placed under selection and protection working circle for the main purpose of wood production and watershed management respectively, tend to fulfill only one objective i.e. wood production alone,

at the cost of neglecting much broader and socially more relevant watershed management objective. With the result watershed value of these forests has been declining at a rapid rate. Consequently, a shift from the former to the latter has been causing the increased run off and stream flow during rainy periods and drying up of perennial streams and rivulets in the dry seasons. This is a major social cost from the ecological point of view, though it cannot be exactly priced or quantified. In addition to this another cost which affects the ecological balance is the loss of wide life. This is primarily because, the floral diversity of natural forests supports a variety of wild life as compared to only few specific animals supporting capability of the monocultures. As against the above mentioned social costs, the social benefits to the society were very few and were accruing mainly to certain sections of the society like industrialists, timber traders etc.

To sum up, in this chapter we have argued that, as a result of following central schemes by the Kerala Forest Department, a basic change in the forest ecosystem of the state was observed viz. from a multispecies natural forests to monocultures of largely Teak and Eucalyptus plantations. This would mean a change in the future product mix from the forests such that in future mainly Teak and Eucalyptus would be available to the society (which are generally utilized by industries and government institution, at the cost of the availability of the species of timber used by the common men.

Though the policies and schemes followed led to the achievement of two direct benefits to the state - increase in revenue from forests and increase in industrial wood production - it was at a considerable social cost.

Notes and References

1. The CABFU was constituted in 1948. Since the early fifties the successive Union Ministers for Agriculture have been discussing this issue and recommending for increasing the plantations of industry oriented species and this recommendation has been unanimously supported by the Forest Ministers and senior officials of various states. See for example, Proceedings of the Second Session of the CABFU, 1953. Also see, C.R. Ranganathan Report on the Third World Forestry Congress, Helsinki.

2. With the success of these experiments grassland afforestation division was formed in 1961 and was placed under a newly formed circle set up in 1960 called development circle consisting of Parambikulam Teak plantation division, Liasion division and Tram way division.

3. Karunakaran, C.K(1985) Keralathile Vanangala Noottandukaliloode Trivandrum, Kerala Bhasha Institute p.237.

4. Special industrial plantation divisions mainly for growing Eucalyptus were formed at Perumbavoor, Valachal, Kalady and Perumoozhi.

5. Apart from the earlier mentioned four special industrial divisions a new industrial division was formed at Kothamangalam which was also attached to this circle. See Karunakaran, C.K.(1985), Op.cit. p.237

6. The three special divisions were (a) the Kallar Valley Teak plantation division (started in 1960) (b)Parambikulam Teak plantation division (started in 1964-65) and (c) Edamala Valley Teak plantation division started in 1964-65). Karunakaran C.K.(1985) Op.cit. p.233-234

7. Refer Chapter 3 for details on Taungya .

8. During those years most of the wood production was met from the moist deciduous forest areas cleared for raising artificial plantations since the overall demand for wood was less. The few highly demanded woods were mainly hardwoods like Teak, Blackwood, Ajnili etc. the naturally growing species in moist deciduous forests.

9. To give one example, a draft working plan prepared in 1974 for Ranni division prescribed felling of 14 trees per hectare. Refer, Nair, C.T.S. et.al(1984), Op.cit. p.92

10. It was reduced to 180 cms in the above mentioned draft working plan of Ranni from 210 cms prescribed in the earlier working plan of Ranni, prepared in 1961. Ibid.

11. Under the heading 'communication' apart from roads, expenditure is made on construction and repairing of bridges and culverts by Forest Department. Though the expenditure made exclusively on road construction and maintenance is not available, it was learnt from several senior forest officials that the major portion of communication fund had been utilised for road construction and maintenance.

12. We are constantly referring to Ranni division because Ranni is an important division from the point of view of selection felling. It has the largest forest area among all the forest division of the State (1050 square kilometers i.e. about 11.5 per cent of total forest area). Moreover most of the forests situated in this division belongs to Evergreen and Semievergreen type in which selection fellings are made to fell industrial tree species. See, Nair, C.T.S., et.al, (1984), Op.cit.

13. Through an agreement dated 7th October, 1974.

14. It was also agreed that Forest Department would provide 1,05,000 tonnes of reed annually to the HPC. The government further agreed to create, subject to certain conditions, additional plantations near the HPC project area for supplying the raw material for the manufacture of 80,000 tonnes of the products annually. (Agreement deed between Government of Kerala and HPC).

15. See for instance, Economic Review of 1975, 1976 and 1977.

16. Annual Report of KFDC, 1984, p.4.

17. Till date no published official record is available about the possible yield from Eucalyptus plantation. One personal enquiries with one of the regional managers of KFDC it was understood that about 45-50 MT

sold

per hectare yield was obtained from an area felled in 1985 to be sold in public auction. It was also given to understand that in very few other areas the yield per hectare would be same; in general, yield per hectare would be less than 45 MT/hectare.

18. Here, again no published official data is available to provide reason for non supply of the raw material as was proposed in the agreement. It was gathered that cost of raising Eucalyptus per hectare is coming to more than Rs.300/- while the rate agreed upon by government for supplying Eucalyptus to HPC is as low as Rs.11/- in the agreement.

19. See, Administrative Report of Kerala for 1957, and Karunakaran C.K. (1985) Op.cit.,

20. Till date labour is the most important cost involved in forestry works. Labour is required for carrying out numerous works right from the time of aligning and taking up to final fellings. Since all the forestry activities are carried out on government reserve forest lands, generally no value or cost is assigned to it, on the basis of reasoning that opportunity cost of forest land is nil as it is not available for non forestry purposes.

21. Thinning in forestry terminology is referred to a process of intermittent cutting of trees before final cutting on certain fixed years of plantation, in order to obtain required size trees from an original closely spaced plantation by the time of final felling.

22. See Nair, C.T.S.et.al.(1984), Op.cit; p.31

23. Though, ideally the protection working circle ought to have been constituted keeping in view the terrain, the soil characteristics, rainfall intensity and watershed potential of any forest area, one finds that in actual practice in Kerala the inaccessibility of the forests seems to be the only criteria for its being classified under the protection working circle.

24. See for detail Chapter I.

25. See for detail Chapter III

26. For seeing the direct relation between tapioca cultivation especially on hilly slopes and increased soil erosion refer (a) CTS et.al, Op.cit. p.136 (b) Chattopadhyay Srikumar 1985 p.227-229 (c) Chattopadhyay Srikumar et al, "Trends of deforestation in Kerala in the Upper Catchment of Valapatana River and Mangalam - Gayatripuzha Sub basin. (unpublished)

27. Simply speaking gene pool is a term which denotes the presence of various forms of life, plant, animal, micro organisms, micro flora, in a natural place e.g., in an eco-system like forests, which represents as a pool of genes of different living beings.

Chapter 7

SUMMARY AND CONCLUSIONS

The principal focus of this study, was to analyse the factors governing deforestration in Kerala. The departure of the study from that of the earlier work on the subject is that we have conceptualised deforestation as an outcome of the interaction among the factors governing agricultural expansion and forest land use on the one hand and nature and extent of forest resource management and utilization on the other. Since forests are a complex and ecologically specific resource, we took up the case study of a region namely the State of Kerala. For the purpose of tracing the historical roots of deforestation, we narrowed down the geographical coverage of the study prior to independence to the former State of Travancore. The main findings of the study and its policy implications are the following.

Major Findings

Early signs of deforestation were visible in Travancore during the second half of the 19th century. Largely this was facilitated by the State policy of encouraging foreigners to raise Coffee and Tea plantations

in the forested hills. An indirect effect of the development was the inmigration of population in search of employment and agriculture. The socio-economic mobility of Syrian Christians and Izhavas, development of the market for land, the construction of ghat roads were the main factors that facilitated this inmigration. An immediate consequence of this population increase was the encroachment of people on forest land for settlement and cultivation of food crops.

This period also witnessed significant changes in the management and utilization of forest resources in Travancore. Until the middle of the 19th century the State earned revenue from forests largely by the procurement and export of cardamom. All the administrative machinery of the forest department was largely oriented towards this task. However by 1860's, it was felt by the State that there existed a huge potential for augmenting the earnings from forests through extraction and export of Teak and other Royal trees. In order to realize this potential, the State created two organizations with the forest department; one to manage the activities of cardamom procurement and export and another for the extraction and export of timber. To increase the outturn of timber, the State appointed a large number of contractors. However, the working of the contractor system resulted in large scale illicit felling of trees. The State also attempted to increase the earnings from timber export by entering into contract with a Bombay firm.

During the period 1890-1947, most of the forces that operated in the previous period continued to operate more intensively in the forest

sector of Travancore. This period also witnessed the emergence of certain new trends, largely set in by the implementation of the Forest policy of 1880's. This policy was designed to achieve the short term objective of increasing the revenue and the long term objective of maximising the direct and indirect benefits on a sustained basis from forests. However, the implementation of this policy did not yield the desired results. Since the saleability of the timber trees of Travancore remained stagnant, revenue from timber also remained stagnant. At the same time, the expenditure on forest department began to increase at a faster rate than revenue. In this situation, the department started a vigorous revenue increasing effort essentially through commercialisation of timber and other forest produce. During this period, the department introduced the system of protection and reservation of forests so as to increase the extraction of saleable species of timber. This combined with the fact that the forest department is considered a revenue earning department prompted the State to modify its Forest Policy and Programmes for achieving the short-term objectives of maximising revenue through increased extraction at the cost of long term objectives. The uncontrolled extraction of timber and some of the methods (like lump sum sale) adopted for this resulted in continuous reduction in forest area. This shift in emphasis was further reinforced due to tremendous increase in demands of all types of timber (especially softwoods) during the second world war

period. Consequently, during this period forest department was never able to scientifically manage its predominantly evergreen and semievergreen forests.

The agricultural expansion in the forested hills of Travancore, continued at a rapid rate during 1890-1947. To a large extent this expansion was for the cultivation of plantation crops like rubber and tea. However, a more serious development during this period was the problem of encroachment on forest land. The genesis of this phenomenon could be traced to the State policies for encouraging the cultivation of cardamom and food crops. These encroachments which began initially as a process of consolidating already existing land or acquiring a small piece of forest land in subsequent stages turned out as a large scale venture of grabbing forest land, its illegal possession and profiteering through sale. This problem got aggravated during the post-Independent period.The State's own policy of resettling various groups and individuals, providing land for grow more food campaign and for other allied agricultural activities and the method of successively regularising encroachments by advancing cut of year of encroachment has contributed to the increasing spread of encroachment. Inspite of several efforts made by various committees through out the period not only old encroachers still exists, but fresh encroachments are taking place. A measure of the problem can be noted from the fact that about 32,000 hectares of forest land is under encroachment by 1986. In addition to this, the expansion of cardamom cultivation and the continued existence of the dual

control on the Cardamom Hill Reserve by the Forest and the Revenue Department has facilitated large scale illicit felling of trees and conversion of cardamom lands in to other crops.

The various developmental and welfare schemes undertaken by the State also contributed to significant reduction in forest cover during the post-Independent period. As much as 60 thousand hectares of Forest land was diverted for these purposes. In addition to this, large extent of forest land was also diverted for various public sector plantation corporations.

/ The last 30 years witnessed the most harmful changes in the management of forest resources in Kerala. During this period, the State has accepted the National Forest Policy as the guideline for the management of its Forests. The period also witnessed the implementation of a number of centrally sponsored schemes in the Forestry sector. The major benefits obtained by following the National Forest Policy and the centrally sponsored schemes were the following: (1) the total area under artificial plantations of industry as well as high valued export oriented trees have increased; (ii) the revenue of the State has increased considerably However, these objectives were achieved by clearfelling the original mixed deciduous forests and by intensifying the extraction of softwoods and otherwords from the existing evergreen and semi evergreen forests. This has caused (i) an imminent and serious problem of reduction in forest resources itself (ii) rapid reduction in evergreen and semi evergreen forests. Because of

the severe impact of the former process on the forest cover, the State has enforced complete ban on felling of trees in the mixed decideous forests since 1983. The degradation of the evergreen and semievergreen forests has resulted in continuous supply of wood to the industrial units. However, it also has caused adverse impact on the capacity of the forests to yield indirect benefits.

Policy Implications:

The foregoing findings of the study shows that for effectively curbing the ongoing process of deforestation in the State, it is necessary to adapt an integrated approach to the management of forest resources. Such an approach should consist of policies and programmes for not only curbing the forces that has exerted various types of demand on forest land, but also measures to sustain the productivity of forests through improved management practices. More specifically while taking decisions on the investment pattern of the forestry sector, care should be taken to maximise the production timber and other forest products which are needed by the common people. In order to bring out such an approach to forestry development, the State has to effect a number of changes in forest policy.

(a) Policies on Encroachment:

In order to curb encroachment on forest land the following changes are needed: (i) The absence of proper demarcation between private land

and forest areas has facilitated encroachment on forest land in the past. To prevent this, permanent demarcation of forest boundaries should be done through survey and mapping wherever necessary (ii) In the past encroachment on forest land has taken place because of the dual control on cardamom land and the policy of the State to regularise at frequent intervals encroachment up to a cut off point. Inorder to curb such tendencies in future, no further extension of cut off point on encroachment should be given. The existing dual control on Cardamom Hills should be abolished. The responsibility of controlling both land and trees should be left with the forest department. The present land tenure system in the cardamom hills should be continued.

(b) Use of land for other purposes:

In future, as far as possible, the State should not divert forest land for other uses. However, if it has to be done (in the use of projects for which there are very little alternative options), the project authority should be requested to undertake afforestation work not only in the Project area, but also in an equal extent of land in the degraded forests of the State. The State should no more raise public sector plantation on forest lands.

(c) Modification of management practices in mixed deciduous forests:

In the mixed deciduous forests, complete ban on felling exists since 1983. This has adversely affected the supply of timber for various uses. To ease the pressure on the availability of timber it is necessary to modify

the management of timber felling in these forests along the following lines: (i) Depending on the nature location and extent of forests, attempt should be made to identify and classify the available mixed deciduous forests in to commercial production zones and community production zones. Commercial Production Zone could be felled and afforested for meeting the needs of industry, trade and export. In this zone the policy of raising monoculture plantations (like Teak, Eucalyptus and Softwoods) can be taken up. In the community Production zone a low intensity of selection felling may be allowed. This should be judiciously followed by raising of artificial plantations of wood which are commonly needed at the household level. (ii) In the non-traditional sector, the ongoing social forestry programmes should be modified so that its benefit will go to the marginal and small farmers and increase the supply of commonly required timber and other tree products. The farm forestry component must supply such species of the farmers which they require on the basis of their previous familiarity with the species and then requirements of fuel timber and other tree products.

(d) Management of evergreen and semievergreen forests

At present, felling in these forests is done largely to meet the demand from industries. This has resulted in the deterioration in the structure and composition of forests. Inorder to improve the conditions of these forests the following changes are needed; (i) Selection felling in forests which are vulnerable due to their location (like those on steep

slopes) and conditions should be completely stopped. (ii) In other areas of these forests which are comparatively more degraded the number of trees feeled per hectare should be drastically reduced till they recover by a process of constant regeneration and tending (iii) By implementing selection felling system more judiciously in other forests it would be possible to enable the regeneration and growth of trees in such lands; (iv) The felling cycles should be increased for most of the species.

Apart from these specific policy changes the following general changes are also warranted in the future planning of the forestry sector. It is necessary to modify the format and content of the current working plans with a view to achieve the actual purpose of working plans by integrating it with Five Year Plans. Currently modifications are made only to achieve Five Year Plan targets at the cost of long term direct and indirect benefits. Consequently, the original prescriptions made in the working plans for 10 to 15 year period are not followed and adhoc and short term targets are fixed; (ii) There is need to strengthen the administrative and organizational set up for proper sylviculture and physical protection of forests.

Appendix 1

ECOLOGICAL SPECIFICITY OF VARIOUS FOREST TYPES IN INDIA THEIR STRUCTURAL AND FUNCTIONAL DIFFERENCES

The natural characteristics (i.e.,the intensity and extent of different type of plants and animal life existing in each forest , the present evolutionary state of the forests, the regeneration capacity of various plants and animal life etc.) of each of these forest types is determined by several factors mainly climatic, edaphic (soil) and biotic (human) factors. Among the climatic parameters the total quantity of rainfall, pattern of distribution of the total quantity of rainfall in a year, the season of occurrence of rainfall and the mean temperature of the coldest month, apart from topography and light conditions are the most important ones. Therefore, each forest type is a distinct ecological formation governed by several factors.

This distinctness and ecological specificity of different forest types can be better understood by seeing the various components of a forest ecosystem. Each forest has three distinct components; (1) various type of plant life (mainly trees) (ii) Different type of animals (carnivorous and herbivorous) (iii) billions of microflora and fauna mostly present below the soil surface. There are several interlinked cycles which

work among these three major components albeit unnoticed all the time and in the process involve flow of energy, nutrients, water, oxygen, carbon and various other elements.

The ecological specificity of each forest type lies in the differences in complexity and diversity of the three major components and the various interlinked cycles going on inside a forest ecosystem. For example a Xerophytic Dry Thorn Forests found in desert conditions or monospecies Coniferous Forests found in temperate zones have much less diversified and complex components and cycles than various dry or wet mixed forests seen throughout the plains and Deccan Plateau part of the country. While among the mixed forests the Wet Evergreen Tropical Forests or Tropical Moist Forest (TMF) are the most complex in terms of range and intensity of its components and cycles.

It is due to this specificity of each type of forest ecosystem that there are structural and functional differences among different forest types. The main structural differences are in the range and type of trees present and their regeneration capacities in each forest. Most of the coniferous temperate forests have only one tree species and therefore their regeneration can be manipulated and assured. Given this property these forests can be brought back to their original condition from their disturbed or degraded condition on applying suitable scientific management techniques within a span of 100 - 150 years. Therefore these forests can be considered as far as trees are concerned, as renewable resources. While the TMFs contains several hundreds of tree species alongwith myriads of other plant and animal life, number of trees utilized and to be regenerated is much larger in TMFs.

This being so, it is difficult even to regulate and monitor the regeneration of all the important trees utilized from a TMF not to talk of reclaiming a degraded TMF into its original condition. fact, of late, it has been argued that once a natural TMF is disturbed beyond a limit as is usually the case in developing countries like India, it is not possible to bring back the original diversity and complexity of that TMF within several hundred years period also (Davidson J, offprint). Thus from the point of view of maintaining the original structure of the TMF , the TMF can no longer be considered as renewable resources (Gomez Pompa et al, 1972). Functionally, the different type of forests vary in the range of utility they have for the society. In general the monospecies temperate forest trees are more useful — in terms of direct benefit to society — in providing timber for trade and industry while the presence of large number of species in mixed forests makes them more useful for common people. Furthermore, due to the fact that after extraction of timber the extracted portion of the monospecies forests becomes devoid of tree growth, they are less useful to society from the point of view of indirect benefits. Because for carrying out such functions like prevention of soil erosion, run off of rain water etc., presence of trees is very essential in a forest. On the other hand, since in TMFs in general, only selected fellings are made there is never a situation where any portion is totally devoid of tree growth (within TMF even in the felled portion certain type of trees and large number of other vegetation is always present). Therefore TMFs have greater utility for society in terms of indirect benefits.

Appendix 2

OBJECTIVES OF WORKING PLANS

The main objectives mentioned in all long Rotation Working Plans were: (1) to localise fellings (2) to extract all overmature and useless trees which interfere with the growth of young and upcoming trees of important species (3) to prepare ground for detailed working plans to be made in future. The second aspect of the first objective (as discussed in Chapter 3) and objectives (2) and (3) are long term objectives.

It would be observed that hardly any efforts were made to fulfil these objectives, throughout the period of our concern. Objective (2) demands that natural regeneration should be encouraged. Obviously to do so one must know the natural regeneration capacity (i.e. germination capacity) of various tree species, the early post germination growth capability, the factors which support their growth and factors which inhibit or retard their growth. In this context the Diwan of Travancore mentioned "Information furnished under this head (i.e., under natural regeneration) is scant and imperfect. According to the Assistant Conservator of Northern Division, the seeding of the more valuable species was very good owing to the early bursting of the monsoon. The Assistant Conservator of Nagercoil sub division reports that 'the drought affected the seeding of Thembavu and other trees in parts of South Travancore'. No information is furnished with regard to other divisions. Mr. Bourdillon thinks the season was 'on the whole unfavourable probably because the rain in July was excessive and long countined'. Full and accurate information on the subject would be interesting and useful and the conservator

will see that his future reports contain complete particulars carefully collected and collated" (Insertion mine) (see, ART, 1895-96; p.78, para 359).

The above remarks clearly indicate that as early as in 1894-95 (the year in which the proposal to make working plans was made) the Diwan had shown his dissatisfaction over the manner in which the information on natural regeneration was collected. It is natural to expect that after formulation of working plans the forest officials would have started collecting information on natural regeneration more systematically.

But this did not happen. In fact, the quantity and quality of information collected on natural regeneration remained almost similar. For example, the information collected on natural reproduction by forest department year after year was as follows:

> "The natural reproduction (i.e., natural regeneration) of valuable trees has been on the whole satisfactory" (Insertion mine) (ART, 1910-11; p.15).

Similarly the objective (3), i.e. making ground for future plan, demanded acquiring such knowledge as how many trees can be felled per unit area of any species without harming the future yield. Apart from the knowledge about how many trees exist per hectare, this requires the knowledge of optimum age for felling each tree i.e., the knowledge about the optimum financial rotation age of each tree. For this purpose throughout the period of our concern all working plans fixed the total number of trees of different species to be felled per unit area on arbitrary basis. This fact can be corroborated by reading the text of all the working plans made in Travancore under the heading 'Rotation'.

For example, "We are still very much in dark regarding the sylviculture and requirements of many of our valuable timber species. Their correct exploitable age or financial rotation is still unknown. Even as regards teak of which we claim to know more than many of the other species there is a good deal of difference of opinion in the matter of the correct financial rotation. Hence, with the limited knowledge we have in this respect, only an arbitrary figure for the rotation can be fixed at present (Working plan of Quilon Forest Division, 1944-45 -1958-59 Menon, N.M. 1953; p.106). The above quotation which was taken from a recent working plan sums up the situation regarding the knowledge about rotation age. This working plan was made in 1953 and would obviously reflect the state of knowledge about any forestry subjects including regeneration till 1953. Although to know the natural regeneration capacity of various species and to find out the total number of valuable plants per unit area for the preparation of working plans a 0.20- 0.25 per cent and 5 - 10 per cent of the forest area used to be surveyed respectively which was neither sufficient nor accurate.*

* See for such argument (1) Nair, C.T.S. et al (1984) Op.cit.
(ii) Nair, C.T.S. and Krishnan Kutty, C.N. (1984).
(iii) Gadgil, Madhav (1982) Op.cit.

BIBLIOGRAPHY

Administration Report of Travancore : Travancore Government Press, Various Issues

Allen, R. : How to Save the World: Strategy for World Conservation, IUSN/UNEP/WWF, 1980

Allen, J.C. and Barnes, D.F. : 'The Causes of Deforestation in Developing Countries' in Annals of Association of American Geographers, 75,2; 1985

Annual Report : Kerala Forest Development Corporation Ltd. Kottayam, Various Issues

Baig, Murad Ali : 'Indian Forests' in Gadgil Madhav, etal, 1982

Bandyopadhyay, J., Jayal, N.D., Schoettli, V. and Singh, Chhatrapati : India's Environment: Crises and Responses, Dehra Dun, Natraj Publishers, 1985

Boreman, F.H. and Likens, G.E. : Pattern and Process in a Forested Ecosystem. Springer Verlag, 1979

Bourdillon, T.F., : Report on the Forests of Travancore, Trivandrum, Travancore Government Press, 1893.

Census of India, 1901, Vol.XXVI, Travancore, Part I : Malabar Mail Press, 1903

Census of India, 1921, Vol.XXV Travancore : Government Press, 1922

Census of India, 1931, Vol.XXVIII, Travancore, Part I Report : Government Press, 1932

Census of Travancore, 1941 Part I & II : Government Press, 1943

Centre for Science and Environment : The State of India's Environment: A Citizens' Report, New Delhi, 1982

Chakravarty, F. : 'Indian Forests - A Story of Neglect' in Sunday Standard Magazine, December 29, 1974

Champion, H.G. and Seth, S.K. : A Revised Survey of the Forest Types of India, New Delhi, Government Press, 1968

Chattopadhyaya, Srikumar : 'Deforestation in Parts of Western Ghats Region (Kerala), India', in Journal of Environmental Management, Vol.20, 1985.

Dasgupta, Ashim, : Malabar in Asian Trade: 1740-1800', Cambridge, Cambridge University Press, 1967

Davidson, J. : Economic Use of Tropical Moist Forests while maintaining Biological, Physical and Social Values, (Offprint).

'Deforestation Daunting'(Article) in The Hindu, March 2, 1984

'(The) Disappearing Green Cover', (Editorial) in The Hindu, December 15, 1983

Eckholm, Erik : Planting For the future: Forestry for Human Needs, Washington D.C., World Watch Institute, 1979

'Environment India' in India International Centre Quarterly, Vol.9.Nos.3 and 4, 1982

'(The) Falling Rain Forest: A Disturbing Story', (Article) in The Hindu, June 14, 1986

Fernades, Walter (Ed.) : Forests, Environment and People: Ecological Values and Social Costs, New Delhi, Indian Social Institute, 1983

Fernandes, W : 'Towards a New Forest Policy: An Introduction in Fernandes, K and Kulkarni, S,(Eds.)(1983)

Fernandes, Walter : 'Forests, Environment and People: An Introduction' in Fernandes, W(Ed.)(1983)

Fernandes, W and Kulkarni, S (Eds.) : Towards A New Forest Policy: People's Rights and Environmental Needs, New Delhi, Indian Social Institute, 1983

Forest Resources of Tropical Asia, Rome, Food and Agriculture Organisation of the United Nations, 1981

Futehally, Zafar : 'The Importance of Trees' in Indian Express, May 4, 1985

Gadgil, Madhav, Baig, Murad Ali, Ranganathan, Shankar, Bhoja Shetty, K.A., George Joseph and David, John : Some Aspects of Forestry in India, Bombay, Centre for Monitoring Indian Economy 1982

Gadgil, Madhav : 'An Approach to a Rational Forest Policy' in Gadgil, Madhav, etal (1982)

Gadgil, Madhav : 'Forestry with a Social Purpose', in Fernandes, W. and Kulkarni, S.(Eds.), (1983)

Gadgil, Madhav., Prasad, S. Narendra and Ali, Rauf : 'Forest Management and Forest Policy in India: A Critical Review' in Fernandes, Walter (Ed.) (1983)

George, Joseph : 'Forest-Based Industry' in Gadgil, Madhav., et al., (1982)

Geographical and Statistical Memoir of the Survey of Travancore and Cochin States : Executed under the Superintendence of Lieutants Ward and Conner, from July 1816 to the end of the year 1820, Madras, Surveyer General's Office, 12th December 1827; Travancore Sircar Press, 1863, Reprinted in 1898

Gleisinger, E. : 'The Role of Forestry in World Economic Development' in Unasylva, No.14. 1960.

Gomez Pampa, A. Vasquez-Yanes, C and Guevara, S. : 'The Tropical Rainforest: A Non renewable Resource' in Science, No.177, 1972

Government Cover Files, English Records, Old Cellar, Government Secretariat, Trivandrum :
(i) File No.10232 (1900-1903)
(ii) File No.10518 (1901-1902)
(iii) Ref.No.12/1001 (1905)
(iv) Ref.No.361/1081 (1905)
(v) Ref.No.120/1081 (1905)

Government of India : The National Forest Policy of India, New Delhi, Ministry of Food and Agriculture, 1952

Government of India : Proceedings of the Various Meetings of the Central Board of Forestry, New Delhi, Ministry of Food and Agriculture.

Government of India : Report of the Committee for Review of Rights and Concessions in the Forest Areas of India, New Delhi, Ministry of Agriculture, Forestry Division, 1984.

Government of India : Report on National Commission on Agricultur Part IX, New Delhi, Ministry of Agriculture Forestry Division, 1976.

Government of Kerala : Administration Report of the Forest Department, Ernakulam, Government Press, Various Issues.

Government of Kerala : Economic Review, State Planning Board, Trivandrum, Various Issues.

Government of Kerala : Kerala Forest Statistics, 1977-78, Trivandrum, Kerala Forest Department 1982

Government of Kerala : Kerala Social Forestry Project Report, Trivandrum, Forest Department 1983

Government of Kerala : Keralathile Samuhya Vanavalkarana Padhathi, Trivandrum, Forest Department (Social Forestry Wing), 1986 (Mimeo)

Government of Kerala : Statistics for Planning, Trivandrum, Directorate of Economics and Statistics, Various Issues.

Government of Kerala : Budget Speech, 1981-82, 1982-83, 1984-85, Trivandrum

Government of Kerala : Western Ghat Development Programme, Status Paper for Area Sub Group, Trivandrum, 1984.

Guha, Ramachandra : 'Forestry in British and Post-British India: A Historical Analysis' (In two parts) in Economic and Political Weekly Vol.XVIII, No.44 October 29 and November 5-12, 1983.

Jeffrey, Robin : The Decline of Nayar Dominance, New Delhi. Vikas Publishing House, 1976

Jha, Prem Shankar : 'Reforesting the Himalayas' in The Times of India, New Delhi, October 26 & 27, 1981

Joshi, Gopa : 'Forest Policy and Tribal Development: Problems of Implementation, Ecology and Exploitation', in Fernandes, K. and Kulkarni, S, (Eds), (1983)

Kannan, K.P. : 'Forests for Industry's Profit' Economic and Political Weekly, Vol.17 No.23, 1982

Kannan, K.P., : 'Forestry Legislation in India: Its Evolution in the Light of the Forest Bill, 1980' in Fernandes, K. and Kulkarni, S.(Eds.) (1983)

Karunakaran, C.K. : Keralathile Vanangal Noottandukalilude, Trivandrum, Kerala Bhasha Institute, 1985 (In Malayalam)

Kerala Forest Statistics 1977-78, Trivandrum, Kerala Forest Department, 1982

Kerala Sastra Sahitya Parishad : Kerala Social Forestry Programme: A Critique, Trivandrum, 1984(Mimeo)

Kulkarni, S. : 'The Forest Policy and the Forest Bill: A Critique and Suggestions for Change' in Fernandes, K. and Kulkarni, S.(Eds), (1983)

Kulkarni, Sharad : 'Towards a Social Forest Policy' in Economic and Political Weekly, February 5, 1983

Lovatt, Heather : A Short History of Peermade Vandiperiyar District, London, 1974(Mimeo)

Mateer, S. : Native Life in Travancore, London, W.H. Allen and Co., 1883

Mathrubhumi(Malayalam daily), Dated August 27, 1986

Meher-Homji, V.M., : 'The Great Peril' in The Illustrated Weekly of India, June 22, 1986

Moench, Marcus and Bandyopadhyay, J. : 'Local Needs and Forest Resource Management in the Himalayas' in Bandyopadhyay, J.et al(Eds.), 1985

Mohanraj, V.M. : 'Deforestation - The Other Side of the Problem' in The Hindu, December 27, 1983.

Muranjan, S.W. : 'Impact of Some Policies of the Forest Development Corporation on the Working of the Forest Labourers' Cooperatives' in Artha Vijnana, Vol.22, No.4, 1980.

Nagam Aiya, V., : Travancore State Manual, Vols.I & III, Trivandrum, Government Press, 1906

Nair, C.T.S. : Land Use Conflicts in the Catchment of Idukki Reservoir; Their Implications on Erosion and Slope Stability, Trichur, Kerala Forest Research Institute, 1984 (Mimeo)

Nair, C.T.S. : 'Crisis in Forest Resource Management', in Bandyopadhyay, J.etal.(Eds)(1985)

Nair, C.T.S, Chundamannil Mammen and Muhamad, E : Intensive Multiple Use Forest Management in the Tropics: A Case Study of the Evergreen Forests and Teak Plantations in Kerala, India, Trichur, Kerala Forest Research Institute, 1984 (Mimeo).

Nair, C.T.S. and Krishnan Kutty, C.N. : Socio-Economic Factors Influencing Farm Forestry: A Case Study of Tree Cropping in the Homesteads in Kerala, India, Paper presented at EWC/FAO Workshop held at Bangkok, September 18-22, 1984a (Mimeo)

Nair, C.T.S. and Krishnan Kutty, C.N. : Forestry Planning in Kerala: Do We Have Adequate Data? Trichur, Kerala Forest Research Institute (Undated) (Mimeo)

Nair, K.N.etal : Development of Cardamom Plantation in the High Ranges of Kerala, Trivandrum, Centre for Development Studies, 1984 (Mimeo)

Ninth Commonwealth Forestry Conference : Proceedings, Committee Reports and Resolutions, 1968

Panikar, P.G.K., Krishnaji, N. and Krishnan, N : Population Growth and Agricultural Development - A Case Study of Kerala, Rome, FAO of the United Nations, 1978

Pillai, P.P.(Ed.) : Agricultural Development in Kerala, New Delhi, Agricole Publishing Academy, 1982.

Pimental, D. : 'Complexity of Ecological Systems and Problems in their Study and Management' in Walt K.E.F.(ed). System Analysis in Ecology, Academic Press, 1966

Prabhu, Pradip : 'Social Forestry: An Adivasi Viewpoint' in Fernandes, K. and Kulkarni, S.(Eds.) (1983)

Proceedings of the First Forestry Conference, (Vol.I), Dehra Dun-1973, Delhi, 1979

Proceedings of the Second Session of the Central Advisory Board of Forest Utilisation, 1953

Puri, G.S., Meha -Homji, V.M., Gupta, R.K. and Puri, S : Forest Ecology -Phytogeography and Forest Conservation New Delhi: Oxford and I.B.H. Publishing Company, 1983

Ranganathan, C.R. : Report on the Third World Forestry Congress, Helsinki, 1949

Ranganathan, S, : 'Relevant Forestry' in Gadgil, Madhav, et al, (1982)

Report of the Fifth Session of the Asia - Pacific Forestry Commission, New Delhi, Food and Agriculture Organisation of the UN 1960.

Revelle, R : 'Energy dilemma in Asia: the need for research and development, Science, No.209, 1980.

Sagrelia, K.P. : Forests and Forestry, New Delhi, National Book Trust, 1982

Saldanha, Cecil J. : 'Forests in the New Forest Policy' in Fernandes, Walter (Ed.) (1983)

Shiva, Vandana : 'Coming Tragedy of the Commons' in Economic and Political Weekly, Vol.XXI, No.15, 1986

Shiva, Vandana et.al : 'The Challenge of Social Forestry', in Fernandes, K. and Kulkarni, S.(Eds.)(1983)

Shiva, Vandana., Bandyopadhyay,J : 'Eucalyptus - a disastrous tree for India' in The Ecologist, Vol.13 No.5, 1983

Shiva, Vandana and Bandyopadhyay, J : Ecological Audit of Eucalyptus Cultivation, Dehra Dun, The English Book Depot,1985

Sinha, Arun : 'Development Versus People, in Economic and Political Weekly, September 8, 1978

Singh, Bright, D., : Financial Developments in Travancore 1840-1900, Ph.D Thesis submitted to the Travancore University, 1949, (Unpublished)

Tucker, R : 'The Forests of Western Himalayas and the Legacy of British Colonial Administration' in Journal of Forest History, 26(3), 1982.

Shetty, K.A. Bhoja : 'Social Forestry' in Gadgil, Madhav, et al, (1982)

Tharakan, Michael, P.K. : Migration of Farmers from Travancore to Malabar, 1930-1960; An Analysis of its Economic Courses, M.Phil Thesis submitted to JNU, 1976 (Unpublished)

Travancore Land Revenue Manual (T L R M) : Travancore Government Press, Trivandrum
Volume II, IInd Supplement, (1920)
Volume I, IInd Supplement, (1927)
Volume II,(Part I) IInd Supplement, (1929)
Volume II,(Part II),IInd Supplement,(1929)
Volume II,(Part II), IIIrd Supplement,(1935)
Volume II,(Part II) IVth Supplement,(1942)
Volume II,(Part II) Vth Supplement,(1950)

Ummayya, P. and Bandyopadhyay : 'The Trans-Himalayan Chipko Footmarch' in The Ecologist, Vol.13, No.5,1983

UNESCO : Tropical Forest Ecosystem, Paris, 1978

Varghese, T.C., : Agrarian Change and Economic Consequences: Land Tenures in Kerala (1850-1960), Bombay, Allied Publishers, 1970.

Velupillai, T.K., : Travancore State Manual, Vols.I,II & III, Trivandrum, Government Press, 1940

Venkateswarulu, J. : 'Ecological Crises in Agro-Ecosystems' in Bandyopadhyay, J. et al(Eds) (1985)

Viswanathan, T.P. : Brief History of Cardamom Hills Reserves, 1978 (Mimeo) (Unpublished)

Viswanathan, T.P. : A Note on the History of Occupation in Forests, 1978, (Mimeo)

Vohra, B.B. : A Policy for Land and Water, Bombay, Centre for Monitoring Indian Economy, 1981.

Roy, Von Mon : Integration of Forests and Forest Industries (Report to the Government of India), Food and Agriculture Organisation,1960

Whitmore, T.C. : Tropical Rainforests of the Far East Clarendon Press,1975

Working Plans(for various Forest Divisions of Kerala), Ernakulam, Government Press