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LAND HUNGER AND DEFORESTATION: A CASE STUDY OF
THE CARDAMOM HILLS, IN KERALA

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Introduction

Essential ecological processes are those processes that are governed, supported or strongly moderated by ecosystems and are essential for food production, health and other aspects of human survival and sustainable development. The maintenance of such processes and systems is vital for all societies regardless of their stage of development.

Evergreen forest is one such process which influences the local climate generally making them milder and helps to ensure a continuous flow of clean water. Some forests are particularly important because they protect soil cover on site and protect areas down stream from excessive floods and other harmful effects.

This paper attempts at investigating a case of human intervention with the evergreen forests in the High Ranges of Kerala, in particular the cardamom Hills Reserve^{1/} which has been heavily denuded and put under crops unsuitable for the area. A case study of this region will give us insights into the socio-economic and political processes that have been operating in the forest eco system during the Post-Independence period. It is important to note that the rate of deforestation has been at a much higher rate in the cardamom Hills in Kerala than in other locations in the State. For instance, 87% of this region (Idukki district) was covered by forest in 1905; by 1965 the proportion came down to 65% and it again sharply declined to 33.4% by 1973. The following table vividly brings out this trend and also makes sharp contrast with the depletion rates in other locations in the High Ranges.

Table 1: Extent of Forest Depletion in the Western Ghats of Kerala

Forest location	Percentage of Forests to total geographical area of the dist.			Percentage difference in depletion	
	1905	1965	1973	1905-1965	1965-'73
i. <u>The Cardamom Hills</u> (Idukki District)	87.08	65.04	33.40	22.04	31.64
ii. <u>The Wynad Forest</u> (Kozhikode, Cannanore districts)	44.55	21.78	12.23	27.77	9.55
iii. <u>The Southern High Lands</u> (Quilon Trivandrum districts)	53.78	39.41	30.52	14.37	8.87
iv. <u>Other Parts of the State</u>	27.20	15.19	9.46	12.01	5.73
v. Total for the State	44.07	27.71	17.06	16.36	110.65

Source: Srikumar Chattopadhyaya Reforestation in Parts of Western Ghats Region (Kerala) India. Centre for Earth Science Studies, Trivandrum 1984.

The large scale conversion of forest lands in the Cardamom Hills has not only affected the micro-environment and thereby affecting the health of Cardamom, which is the highest foreign exchange earner among the spices, but also led to heavy siltation in many of the hydal projects located in the region.

This paper is organised in three sections. The first section traces the course of development of cardamom cultivation in Kerala from the status of a wild forest produce to that of a commercial crop cultivated under private tenure. The period covered stretches upto the end of the British period. In the second section the development that took place

during the post-independence period is discussed. Although the policy followed by the State for allocating forest land for cardamom cultivation during the post-independence period was to a great extent a continuation of the earlier one, the nature of acquisition and the policy of regularisation were entirely different and highly influenced by private interests. In the final section the impact of deforestation on the eco-system is discussed and it stresses that the degradation that followed has had deleterious effects both on cardamom and the soil cover.

I



Growth of Cardamom Cultivation in Travancore

The High Range Division of Travancore is believed to have been the original home of cardamom, though subsequently the spice has come to be luxuriantly grown in many other parts of the tropical world as well. Cardamom Hills which constitute a major portion of the High Range division, account for about 85 per cent of the area and 30 per cent of the production of cardamom in Kerala.

The early commercial policy followed by Travancore under monarchy was one of perpetuation of state monopoly of trade in almost all commodities of commercial importance.^{2/} Until the first quarter of the 19th century, government used to collect cardamom for mercantile purposes from wild growth as well as from ryots' plantations. After the first geographical survey conducted by Lieutenants Ward and Conner (1817-20), the State reinforced initially by appointing a conservator of forests and then in 1823 by the creation of a special cardamom department. The product

gathered was transported to the port of Alleppey where it was sorted, graded and eventually auctioned.

During the early phase of procuring wild cardamom for monopoly trade the government employed tribal labour for collection and curing.^{3/} As the trade prospects for this crop improved in course of time, the government began to increase its control by deploying a detachment of its infantry (the Nayat Brigade) and posting large numbers of watchmen at various places in and around the cardamom growing region to watch the Thavalams^{4/} and the state's frontiers, with a view to prevent smuggling of cardamom and for effective supervision of the collection and the transportation of the produce to the marketing centres.

Since land revenue and the tax on agricultural produce constituted in those days the most important source of income for the state, the government policy had greatly emphasised, the need for encouraging commercial cultivation of the most remunerative crops, which naturally included cardamom. The various land revenue and allotment rules framed during the period between 1860 and 1925 were essentially meant to attract more people into the process of expansion of commercial agriculture.^{5/} Tea, Coffee and Cardamom plantations grew up in the Western Ghat region with land available at very liberal terms. In order to sustain the production of cardamom for the state's monopoly trade in the earlier phase, the government also offered special grants of land for settlement purpose and financial help to cardamom growers.^{6/} However, under the rules passed in 1913, no land was to be assigned for cultivation within 50 yards from the river bank nor on the crest of the hills, to the extent of a quarter mile on each side. The forests were further protected by regulations for the grazing of cattle; the areas such as plantations less than 15 years old and natural forests under 20 years old were prohibited for grazing, in order to protect the young.^{7/}

The system of cultivation of cardamom in this region on a plantation basis was initiated by persons from outside Kerala -- either the British (usually heirs of colonial officials or missionaries) or cultivators from the Madurai District of the Madras Presidency (mostly from Gundalur, Cumbum, Thevaram, Cambay and other neighbouring Tamil Villages and small towns.^{8/} The Tamil growers recruited plantation workers from all over the Madurai district to perform annual agricultural operations in the cardamom estates, the European planters, on the other hand, kept gangs of coolies permanently in their estates to carry out various agricultural operations on a regular basis.^{9/} Among the growers, the European planters and the chetties of Tamil Nadu owned most of the area under the crop.

The terms offered by the State for the procurement of cardamom were, however, not favourable to the growers during the period of the monopoly trade. Between 1823 and 1841, the ryots were given a kudivilay (production price) at the rate of 8 rupces 6 annas and 9 paise per thulams of 20 english pounds of dry cardamom and between 1841 and 1869, this rate was further reduce by 11 annas per thulam.^{10/} In the year 1870, a change was made in the system of payment: the ryot's claim was calculated as a share of the average rate of auction price at Alleppey. Under the system, the ryots received a loan or advance from the superintendent of cardamom Hills at the commencement of each season for weeding and harvesting operations; after the sale of their produce, they were entitled to a share (at the rate of $\frac{1}{3}$ rd between 1870 and 1887 and $\frac{2}{5}$ th between 1887 and 1896 of the average price of each variety) of the market value of their produce less the loan amount and supervision charges and a further deduction of 10 per cent of the total amount in lieu of ground rent.^{11/}

The crop being very sensitive to weather conditions and its price very sensitive to export demand, wide fluctuations in the total output of cardamom and its unit price were very common. Under such conditions of uncertainty, the government found it unprofitable to continue the system of monopoly procurement and trade in cardamom. As the unit price of the produce began to move on a course of steady decline, and a buyers' market developed, the fixed share of 2/5th of the value accruing to the growers ceased to give them any incentive for increasing production. Moreover, the government found it impossible to ensure a satisfactory system of procurement, a situation which further accentuated the feeling of uncertainty among the growers as well as the government.

This uncertainty of the cardamom therefore eventually led to significant shift in the State policy; namely, abolition of State monopoly of trade in cardamom in 1896 (in the kanniellam tract,^{12/} the monopoly was lifted only in 1907) and the beginning of an era of active governmental encouragement and support to private enterprise in cultivation for increasing production.

With the abolition of State monopoly, trading in cardamom had passed initially to the control of a group of traders called Nattukotta Chetties. They purchased all the Makaraelam^{13/} cardamom from the ryots. In the cardamom hills, the number of traders increased from 183 (118 of them were chetties) in 1891 to 277 after a decade.^{14/} As in the case of growers, these traders also came from the nearby Tamil region. They controlled large estates in the High Ranges and handled most of the cardamom produced in the Palani Hills of the Madras Presidency and in the Travancore region. With preponderance of the Tamil Traders, the marketing centre shifted from Alleppey (in Travancore) to Bodinaikanur

(in the Madras Presidency). The small town of Bodinaikanur, situated in the eastern outskirts of the High Ranges, in Madurai district, assumed subsequently the status of "Cardamom City" on account of the large quantity of cardamom trade in that centre.

Rapid expansion of area under cardamom plantation was the result of a deliberate policy of the state followed during the early decades of the present century. A system of tax at a uniform assessment rate of Rs. 6/4 per acre was the first step in this direction. Apart from this the government also introduced a scheme of assigning cardamom lands to prospective cultivators on payment of tharavila (land value) and the issue of patta. At the beginning, 655 pattas were issued in the Makaraelam division and 9,435 acre were registered for cultivation. Since then both the area under cardamom and the number of pattas increased significantly.^{15/} For instance by 1904-05, the total area under assessment was reported to be 13,693 acres, distributed among 1103 pattas; by 1908-09 the area and the number of pattas increased to 19,022 and 1515 respectively. This scheme was further revised and assignment continued under the revised rules of 1935, 1937, 1939 and 1942. The rate which was initially Rs. 10/- per acre was subsequently revised to Rs. 25 and Rs. 85 per acre in the case of normal registry and to Rs. 125 per acre for lands entered upon without permission for cardamom cultivation.^{16/}

During the early period of expansion of area under cardamom cultivation, the rules were very liberal and there was no ceiling on the extent of a single holding. However, by an executive order during 1940, it was stipulated for the first time that a single applicant may be given land only up to 60 acres. Such an order was deemed necessary on account of the increasing demand from a host of immigrant cultivators

in the High Ranges for assignment of land for cardamom cultivation. While framing the rules for assignment and allotment of forest land for cardamom cultivation the government had from the very beginning introduced provisions for the protection of the forest growth. For instance the rules of 1896, 1899, 1900 and 1913, stipulated that only undergrowth and such other trees as it was necessary to fell for the cultivation of cardamom could be cleared and also the holding could not be cleared for the purpose of cultivating crops other than cardamom. However, the ryots were permitted to utilise the trees left as shade for growing pepper. The superintendent of the cardamom Hills had also the authority to permit cultivation of such other crops which would not interfere with the growth of cardamom. The rules finally provided for the resumption of holdings for contravention of any of the provisions of the rules or any other rules which may be passed from time to time.

Immigration of both cultivators and labourers has remained a regular phenomenon in the High Ranges Division ever since the beginning of the 20th century. Apart from the large capitalist cultivators who were attracted by reinvestment possibilities in high valued plantation crops, a large number of small and medium farmers and labourers also came from the low wage areas of the early Tamil districts and from the high land value areas of the mid-and low-land regions of Travancore.^{17/} During the period 1911 to 1951, the percentage increase in population was the highest in the High Range Division, the highest rate of increase within this period being in the decade 1921-31 caused by the expansion of area under crops like tea, coffee, rubber and cardamom. Most of the early immigrants have come to the region as estate coolies and a large majority of them acquired forest lands for cultivation in the course of several decades.

Because of the mounting pressure on land in the High Ranges, government introduced a series of rules and procedures stipulating prohibition of registry of land, restriction on the extent of land possessed, duration of lease and the right over other forest produce, especially tree growth. In 1942, in the context of grow more food campaign, the government further prohibited all registries of government land, and instead provided for the grant of land or lease for periods ranging from 3 to 7 years.^{18/} This communique was applicable to cardamom lands also. In 1944, under the Kuthagappattam lease rule, the lease period was raised to 20 years and the individual ceiling fixed earlier at 60 acres was reaffirmed.

Like in the case of the earlier rules for the allotment of forest land for cardamom cultivation, the policies followed during the inter-war period and later, also had taken extreme care for preserving the tree growth and the forest. Detailed rules and procedures were laid down (under the cardamom Land Assignment Rules) for this purpose. In cases where irregularities were found, the lease was terminated and penal action taken on the assignee. The revenue and forest departments were given the responsibility for strict implementation of the rules. The revenue department was given control over the land assigned and leased out for cultivation, while the forest department retained control over the trees on the lands so assigned and leased out and also over the land and trees in the rest of the area. Such dual control of the cardamom Hills, while helping the revenue department to collect the land revenue and other taxes from the planters, also helped the forest department to prevent encroachment by immigrants of other land not suited for cardamom cultivation.

The state policy of encouraging the cultivation of cardamom through assignment of forest land resulted in significant expansion in the area under the crop. Towards the beginning of this century, the area under private cultivation was about 15 thousand acres. By the late 'thirties' the area under cultivation increased to 56 thousand acres. The bulk of the expansion in area took place during the twenties, when price of cardamom showed steep upward trend.^{19/} Around 1900 the estimated productivity per acre was about 20 kg per acre; this increased to 35 kg by the late 'thirties. Such improvement in productivity must have been the result of the development of this crop from the status of a wild forest produce to that of a crop cultivated under private tenure; and the significant improvements made in the techniques of cultivation including weeding, tillage mulching and curing of the capsule.

In short the policy followed by the government as well as the response of the growers towards cultivation of cardamom in the High Ranges during the early decades of 20th century were mutually achieved with least disturbance to ecological balance.

II

Encroachment and the Politics of Regularisation in the Post-Independence Period

The area under cardamom has increased considerably during the post-independence period. Though similar expansion had taken place during the early 'twenties, the initiative at that time came mostly in response to the deliberate state policy of expanding commercial agriculture. On the other hand, during the post independence period, on

account of demographic change and consequent economic pressures, a series of inroads into the hitherto undisturbed hinterlands of the Western Ghats have occurred.

Historically the cardamom Hills region had the highest incidence of population growth right from the turn of the century. This growth is mainly affected by immigration from the nearby taluks and the adjoining districts. Nearly 75% of the migrant households (in 1961) came to the region within a short period of 15 years since independence and the rate of inflow continued to increase thereafter. However, the process of landholding in this region during the post independence period is distinctly different from that of the earlier decades. For instance, if allotment of cultivable wastes and forest shades at favourable terms for commercial cultivation had been the main incentive for the early immigrants, the new immigrants mostly resorted to encroachment and subsequent agitation for legalisation of occupancy rights.

There were only few instances of small scale encroachments in the Cardamom Hill Reserve during the thirties and fourties which were induced by the rules of assignment of forest land for cardamom cultivation. However, massive encroachments were reported only from the early fifties, when the policy of the government emphasised provision of cultivable land in the arable forest regions of the state to land-hungry peasants and land less labourers. During the 'fifties various programmes were in existence, such as the High Range Reclamation scheme for providing waste lands for cultivation and there were rules for the allotment of land in various high land villages under the Kuthagappattam lease rules (at the rate of 5 acres per family in order to increase the production of food crops).

Attracted by these opportunities, hordes of land grabbers rushed up and cleared vast areas in the cardamom Hill Reserve.^{21/} Most of the pioneer occupants sold out their lands for profit to new comers and moved for fresh encroachments in the more interior forest areas. In this manner by 1956, almost the entire eastern portion of the Cardamom Hills reserve came under some form of cultivation or other. In 1955-56 about 35,000 acres of occupied land in the Cardamom Hills Reserve were to be declared non-revertible and set apart for assignment to the occupants. These allottees, had also in fact appropriated more than what was legally allotted to them by the government. The inflow of encroachers to the forest lands kept on growing. The middlemen and the speculators also played a crucial role in the process. Another spurt of encroachment took place between 1958-1960, when about 1,50,000 acres of forest land was encroached at different locations in the Cardamom Hills Reserve. The process of encroachment continued during the 'sixties and seventies period. Though we have no quantitative data to assess the extent of such encroachments during the recent past, an account of the various agitations on the issue and the proceedings of the government during this period clearly indicate that massive unauthorised occupation of forest lands have taken place at various locations in the region.

There are two important factors that contributed to the growth of large scale encroachment on the forest area: (a) inefficiency of the administrative set up to prevent encroachment and (b) the government policy of legitimising encroachment already made on land not suitable for cardamom cultivation. As mentioned earlier, during the pre-independence period the land assigned for the cultivation of cardamom had been

under the dual control of the revenue and forest departments, the forest department retaining control over the other non-assigned land as well as over the tree growth in the entire area. This rule was changed in 1950 and the control over all forest land was vested with the revenue department, the forest department retaining control over the trees alone.^{22/} In 1957, the earlier system was reinforced for a year. After 1958, the control over land and control over tree growth were again vested separately with the revenue and forest departments, respectively. By an amendment in 1970, the government gave the forest department the control over the land leased out (or suitable for leasing) lying alongside the forest preservation areas.

Such dual control over the forest region made the illegal occupation of forest area very easy for the encroachers. The primary responsibility of preventing encroachment lies with the forest department. But the forest officials are ineffective in discharging this responsibility effectively, since land in the Cardamom Hills Reserve remain under the control of the revenue department and the forest department can intervene only when the trees are cut. Therefore, in a situation where unauthorised occupation of forest land is not considered an offence, an regularisation is eventually granted by the revenue department irrespective of the legality of the occupation, effective action as envisaged in the Forest Act against mere felling of trees has become almost impossible.

An important aspect of the encroachment of forest land since the early fifties was the occupation of a large proportion of the land not suited for cardamom cultivation.^{23/} Such area under occupation ranged from grass land interspersed in the cardamom area to moist

deciduous forests containing valuable tree growth. But the rules of assignment of forest land on the Cardamom Hills Reserve permitted legalisation of encroachment only for land occupied with the specific purpose of growing cardamom. Because of the increased demand for land, government revised the rules of assignment of cardamom lands in 1959 and fixed a 25 acre limit on the maximum extent of land which an individual could take on lease. In 1961, by another amendment, the government increased the lease period from 7 years to 20 years; this amendment made the possession of land in the name of cardamom cultivation more easy.

Thus, in the wake of large scale occupation in the Cardamom Hills Reserve, even areas not suitable for raising cardamom happened to be encroached upon in the name of cardamom cultivation, not with a view to growing cardamom, but to take advantage of the 25 acre limit and get as much forest area as possible. Many of the original encroachers, who had taken possession of the forest area, transferred their land to newcomers for profit. The new comers were mostly absentee land-lords; with the help of middlemen they sold their land piece-meal to landless persons eligible for assignment of land under the Kerala Land Assignment Rules. ^{24/} The majority of the transactions were not covered by valid documents, and physical possession was the only criterion for enjoyment. In course of time, the government had to regularise all such illegal transactions, along with the regularisation of encroachment into other arable forest land which took place under severe economic and political pressure at various stages.

It is possible to obtain some insights into the process of regularisation of encroachments over the last three decades by examining systematically the various deliberations within the state government on

~~encroachment of forest land, eviction of occupants, and provision for~~ rehabilitation of the evicted. A summary statement of the results of such deliberations is given in the following table.

The process involved in the ~~regularisation of encroached land~~ as depicted in Table 2 shows the following: (a) tendency on the part of the state to regularise illegal occupation of forest land as on a certain date, at frequent intervals; and (b) initiating action by the state to evict the encroachers occupying the forest land after each of the above dates. Each time, however, the action initiated led to massive public protests and to the appointment of committees/commissions to reexamine the various dimensions of eviction. And finally on the 'basis' of these reports validation of encroachments is made upto a subsequent date. What is interesting to note here is that, between the time span of the first and the second dates of validation, further massive encroachments, took place. Thus, it seems that the state has been showing a lenient attitude towards encroachments, a policy that has in effect served as a powerful incentive to spread the encroachment mania far and wide and to denude the forest lands of the state continuously without rhyme or reason.

Table 2: Statement of the various deliberations of the Government and Enquiry Commissions on the matter of encroachment of forest land, eviction of occupants and the provisions for rehabilitation of the evictees

<u>Government orders/Committees Enquiry Commissions</u>	<u>Objectives/Deliberations/Action contemplated</u>
1. Government Press Communique on 3-6-1957	All encroachment on forest land after 1-4-1957 would be seriously dealt with and encroachment will not be considered for distribution of land to landless poor.
2. Constitution of Populat Committee on Range Basis in July 1957	The objective was to identify the landless cultivators who had been under possession of forest land and had developed the same before the date of stay of eviction viz. 26-4-1957. In the case of eviction of such persons provision was made to give alternative land for occupation.
3. Government Order on 4-7-1957	The chief conservator of forest was informed that no eviction based on the previous revertible/non-revertible (1955) classification of forest department from taking action against encroachment after 1-4-1957. Many people got into the Reserve of Ayyappan Coil area and forced to pass off as entrants prior to 1-4-1957. The department evicted a few families but the High Land Karshakasangham started agitation and this led to the formation of another Commission.
4. G.Chandu Menon Enquiry Commission	369 families in the above area claimed that they had occupied the plots on the forest before 1-4-1957 and that they are evicted illegally. On enquiry the claim of only 50 families were conceded and the rest were rejected.
5. Conference of Ministers in July 1960.	The deliberation suggested that all encroachments subsequent to October 1959 should be summarily evicted and as regards encroachments prior to October 1959 the Government will issue instruction later.
6. Government order on 27-4-1961	Allowing eviction of encroachers in the western region of Cardamom Hills Reserves. This area comprised of about 70,000 acres. The total number of households to be evicted were enumerated as 6,955 and the effective cultivation as 29,000 acres. The eviction that commenced in May 1961 was stopped when 8,000 acres had been cleared of encroachment. A fresh enumeration was made according to which

the number of households were 9,054 and the effective area of cultivation was reported as 25,500 acres. After the visit of Chief Minister and Forest Minister to this area on 5-1-1963, it was suggested that eviction of the entire area would present many difficulties and therefore to study the nature of concentration of households in the area. It was found that majority of the encroachment took place between 1958 and 1961 and concentrated in 100 to 350 houses scattered all over the area.

The Committee suggested that when occupants and encroachers were evicted the pre 1-1-1960 occupants and lessees would be given alternate land and ex-gratia payment for resettlement. A new boundary line of the Reserve forests area was demarcated throwing out the well established occupied areas. The evicted people found within the new line were resettled in other marginal forests.

The proposal for dividing the occupied area in the western region of the Cardamom Hill Reserve, into two halves and to get the western half evicted was not conceded. Instead it was suggested to shift the demarcating line to still eastward so as to allow occupation of a large number of encroachers. Due to various pressures no eviction took place in the so called preservation area and the entire balance area other than for cardamom cultivation remained occupied.

When eviction in some of the area in the Ayyappan coil Range was started, public protest mounted up. This led to the constitution of the Maniyangadan Committee.

While passing orders on this Committee report, the Government accepted eviction of all encroachers and occupants and those who belonged to this category prior to 1-1-1968 should be given alternate land and ex-gratia payment for resettlement.

It was ordered that encroachments that took place after 1-1-1977 should be evicted and the question of evicting pre 1-1-1977 encroachers would be considered later.

Source: 1. T.P. Viswanathan, Brief History of Cardamom Hills Reserve (1978)

2. K.V. Ramakrishnan, Report on Cardamom (1975)

3. S. Ananthkrishnan, Report on Cardamom Cultivation in the Makara Elam Tract (1979)

7. Preservation Committee,
(Radhekrishna Menon Committee)
Report on 30-1-1963.

8. Conference in the Collectorate
on 23-3-1963

9. 1964 - decision to start eviction of encroachment

10. The Maniyangadan Committee
Report 7-6-1960

11. Government Order 8-7-1977

III

Impact on the Eco-system

The rapid growth of encroachment of forest lands while contributing to the expansion of area under cultivation, has resulted in the following changes in the cropping practices as well as the micro-environment in the Cardamom Hills Reserve:

(a) The migrant farmers adopted a cropping pattern not conducive to the forest eco-system. Most of the farmers who migrated from the mid and low-land areas of the state came in search of agricultural land for livelihood, and they introduced a variety of subsistence crops like rice, coconut, tapioca, and other crops like pepper and rubber in the High Ranges. These were cultivated in the grass lands or deciduous forest areas adjacent to the evergreen forest canopy where cardamom was being cultivated. Thus there have taken place significant shifts in the cropping pattern in the Cardamom Hills.^{25/}

(b) At the initial stages, the cultivation of many of these crops required destruction of the tree growth in the deciduous forest areas. Although the rules of assignment of land on lease prohibit the destruction of the tree growth, the dual control of the revenue and forest departments on the Cardamom Hills made it possible for the cultivators to indulge freely in such activity. As the forest officials were not entrusted with the responsibility of managing the land and leases in the forest region, no objection could be raised for the mere occupation of lands; they would intervene only when the tree growth was cut. Once the land was alienated, the first step of the encroacher was to clear as much tree growth as possible and commence cultivation.

Even if cases were booked against illicit felling of trees no eviction of the occupants could take place in the area and the cultivators could continue their operation leading to further destruction of the tree growth. The construction of hydel projects and isolated human settlements in various locations have also been contributing to the accentuation of the deforestation process.^{26/}

(c) The cultural practices used in the cultivation of many of these crops have not been conducive to the forest environment. Practices like tillage and ploughing in steep slopes lead to serious problems of soil erosion and exposure of the soil to sunlight, eventually leading to a process of laterisation.^{27/}

As a consequence of large scale deforestation in the Cardamom Hills Region, not only that the adverse effects of inappropriate crop-mix, depletion of tree growth and unsuitable cultural practice have resulted in decline in soil fertility and productivity, but the micro environment necessary for the sustenance of the cardamom plant has also undergone irreversible alteration.^{28/} The gravity of the situation is best brought out by the impossibility of sustaining cardamom in such an environment.

"Large scale unauthorised felling of the tree growth from lands suited for cardamom cultivation have taken place mainly for conversion and cultivation of seasonal crops in Vellathooval and Pallivasal villages in Devikulam Taluk and Ayyappancoil, Konnathady, Kalkoonthal, Parathodu and Rajakad villages in Udumbanchola Taluk. Total area cleared and converted for other cultivation in these villages is not less than 10,000 acres. Of these villages, there was heavy and widespread exploitation

of forest in Vellathooval and Pallivasal villages in Devicolam Taluk and in Kalkoonthal, Rajakad and Konnathady villages cardamom cultivation has almost disappeared. Conversions have occurred in almost all ^{29/} other cardamom villages also, but in isolated pockets".

The situation is further complicated by the recurrent pest and disease attacks in recent years and the unscientific cultivation practices followed. Several studies have shown that the fertility status of cardamom soil is generally very high due to the process of bio-cycling in the forest environment.^{30/} In such an environment certain cultural practices like frequent tillage, drastic shade regulation, periodic removal of soil from inter-row areas, deposit of mulch materials beneath the top soil ... etc., which are widely practised, are proved to be very harmful to the growth of cardamom plant. They lead to heavy moisture depletion, poor nutrient absorption and high degree of soil erosion in the region. In fact, it would seem that major technological break-through is needed only to contain the severity of the attack of pests and diseases. Productivity of cardamom could still be reasonably maintained if the crop is allowed to grow freely in its natural forest environment with minimal investment and maximum concern for the maintenance of ecological balance in the region.

In sum, the indiscriminate human interaction in the delicate eco system of the High Ranges has seriously affected the ecological processes in general and the sensitive cardamom plant in particular. The concern for adequate forest cover in the cardamom tract which was shown till the fifties is not shown any more and destruction goes on

unchecked. It is further abetted by the rapidly rising price of the crops grown in the region which do not adequately transmit the costs of deforestation to the private cultivators. The various development institutions are too insensitive to perceive the social cost we have begun to pay. It is all the more complicated by the extremely complex reality facing us in the form of high density of population, lack of any source of livelihood other than land which gets reflected in the "land hungryness" of the population, the politics of petty gains legitimising such hunger encouraging further land grabs and the further degradation of the ecosystem.

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Notes and References

1. Cardamom Hills region form a portion of the Western Ghat in Kerala, covering the geographical areas of Udubanchola, Peermedu and Devicolam taluks in Idukki District. This is the only region in Kerala for which historical documents of the development of Cardamom cultivation for a period of over hundred years are available.
2. Ashim Dasgupta, Malabar in Asian Trade 1740-1800, Cambridge University Press 1967.
3. V. Nagam Aya, Travancore State Manual Vol. III pp. 84-85
4. Thavalams were places in the Cardamom Hills where the harvested Cardamom was brought for drying and transportation purpose under the State monopoly control.
5. Mrs. Heath Lovette, 'A Short History of the Peermedu, Vandiperiyar District', p. 21
6. Administration Report of Travancore M.E. 1077, p. 21
7. Mrs. Heath Lovette op.cit.
8. Ibid. and Administration Report of Travancore MEIC45, p.68
9. Administration Report of Travancore ME 1045 p. 64 and NaganIiya, op.cit. p.93
10. Nagam Iya, Op.cit. Vol.III p.85
11. Ibid.
12. The Nagarampara and Thodupuzha reserves of the Thodupuzha Taluk where also cardamom is grown, are known as the "KanniElam" tract.
13. The area under Cardamon in the Devicolam, Udumbanchola and Peermedu Taluk in the Idikki district are known as the Makaraelam tract. This tract includes the Cardamom Hills Reserve which is co-terminus with the 12 Revenue villages of Udumbanchola Taluk, the Periyar Reserve (the Periyar Peerumedu and Ealappara villages in Peermedu taluks) and the Pallivasal Unreserved".

14. Census of Travancore 1891 and 1901
15. Travancore Administration Reports ME 1071 to 1084
16. K.V. Ramakrishnan: Report on Cardamom 1975 p.6 to 10 1978 and
T.P. Viswanathan: Brief History of Cardamom Hills Reserve 1978.
17. Census of Travancore 1921, 1931 and 1941
18. K.V. Ramakrishnan, op.cit p.11
19. Estimated area and productivity of Cardamom in the Cardamom Hills Reserve Region

Year	Area (1000 Acres)	Productivity Kg/acre
1900-1906	15.0	20.2
1911-1916	21.0	22.6
1919-1922	24.6	N.A
1929-1932	51.8	N.A
1935-1939	56.6	35.93
1942-1942	39.1	N.A

Source: Various issues of the Travancore Administration Reports

20. Following the example of the European planters, the other smaller growers also brought out significant changes in the techniques of curing cardamom; while it was earlier dried in sun light. The use of curing chambers for better drying became widespread by the twenties and 'thirties'. These technical changes resulted in significant improvements in the quality of the dried capsule by retaining its green colour.
21. T.P. Viswanathan op.cit.
22. K.V. Ramakrishnan op.cit.
23. T.P. Viswanathan op.cit.
24. Ibid.

25. Kerala State Landuse Board: Land Use Plan for Idukki District Trivandrum 1984.
26. Census of Kerala - 1971. District Census Hand Book Idikki
27. P.K. Zaharia "Need for Mulching in Cardamom Culture". Report of the Proceedings of the National Symposium on Plantation Crops. CPCRI. Kasargod 1976
28. The impact of these on the forest eco-system may be understood from the environment in which cardamom is cultivated in the Western Ghats. The plant prefers a warm humid atmosphere and a temperature ranging between 50° to 95° F, thriving best in shade provided by the lofty trees. The plant is very sensitive to wind and grows well only in slopes of hills or plain lands lying against the normal direction of the wind. The crop also requires plentiful supply of hume and fairly distributed rainfall over 60 inches. Depending on the variations in the micro-environment in which the crop is grown, its productivity also differs significantly.
29. A note prepared at the collectorate, Idukki, for perusal of the Minister, A Brief History of Administration of Cardamom lands in Idukki District, Chapter V 1978.
30. In a forest little is lost until the timber is destroyed. It is estimated that an hectare of cardamom plantation gets an average of 5 to 8 tonnes, of leaf from leaf shedding adding 50-80 kg of N, 12-20 Kg of P and 75-120 Kg of K. Vegetation further improves it and the nutrient removal by cardamom is very low. Nutrient removal on account of harvesting 100 Kg of cardamom is only N-1 .28 kg, P -0.28 Kg, and K -3.84 Kg.

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