

**Causes and Consequences of Change in Cropping
Pattern: A Location-specific Study**

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Causes and Consequences of Change in Cropping Pattern: A Location-specific Study

R. Mahesh*

1. Background of the Study

During the past three decades the agriculture sector of Kerala has undergone wide-ranging changes in terms of ownership of land, cropping pattern, cultivation practices, productivity, and intensity of cultivation. Unlike the other regions in India, the farm front of Kerala is characterised by extreme diversity in its bio-physical resource base and agro-climatic endowments providing multiple opportunities for raising a variety of crops. In earlier periods, the choice of cropping pattern was guided by agronomic considerations and consumption needs of farmers; but it seems that mainly market forces determine the emerging trend. Official figures show that agricultural income in Kerala which showed a steady growth up to the mid-seventies, began to decline thereafter and showed a vacillating trend in the eighties. This change is mainly attributed to the shift in area from seasonal/annual crops to high-value-yielding perennial cash crops having a long gestation period. By the end of the eighties, cash crops started generating higher income to the farm sector. Therefore, during the past five years agricultural income has started rising. However, the questions whether this performance is sustainable and the emerging cropping pattern is in the best interest of the State, require serious consideration.

Special features of Kerala

Kerala was formed on 1 November 1956, consequent on the reorganisation of States on linguistic basis. It is a narrow strip of land about 585 km in length located at the southern tip of the Indian peninsula between the Arabian Sea on the west and the Western Ghats on the east. The land slopes from east to west. Based on topography, the State may be divided broadly into three regions, namely, low land, mid land, and high land. In the low land region bordering the Arabian Sea, the soil in most places is sandy, but the wet land tracts contain clayey soil also. Rice and coconut thrive well in this region. The mid land comprising rolling hills and valleys provides a variety of crops. The soil here is mostly laterite. The high land region is almost entirely covered with forests and is best suited for plantation crops like tea, coffee, and rubber.

The State gets copious rainfall from the south-west monsoon during June-August and from the north-east monsoon during October-November.

Kerala covers an area of 38,855 sq. km, with a population of 290.98 lakh, as per 1991 census. The density of population of the State is thus 749 persons per sq. km, which is the second

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highest among the Indian States. The State has a high literacy rate of 90 per cent that is the highest in India. There is very little rural-urban divide in the State though the urban population as per the census definition is 26 per cent. There are no villages in Kerala in the sense in which a village is understood in other parts of the country. In fact, the urban and rural areas merge and form a continuous stretch. The entire countryside is spotted with houses. Most of the farm activities are carried out in the land around the house. The prevalence of homestead farming is thus a special feature of Kerala. About 62 per cent of the land area is cultivable, and 58 per cent has already been brought under cultivation. Of the remaining 4 per cent, about 2 per cent is cultivable waste and the remaining is left as fallow. According to official records, about 5.7 lakh hectares of land is classified as wet lands, but the actual extent of wet lands is much less. Because of the high density of population, pressure on cultivable land is very high, the supply availability being less than 20 cents per person. The average size of an operational holding according to 1991 Agricultural Census was only 80 cents. In fact, nearly 93 per cent of the holdings are less than one hectare in extent.

Rice is the staple food of the people of Kerala. Now it produces only around 10 lakh tonnes per year as against an annual requirement of about 37 lakh tonnes. The State is thus highly deficient in the production of its staple food. The traditional crops of Kerala are, besides rice, coconut, arecanut, jack, mango, banana and plantain, pepper, ginger, and turmeric. The plantation crops like rubber, tea, coffee, and cardamom are grown mainly in the highland regions.

Kerala implemented land reforms as early as in 1970. Therefore, landlordism disappeared and the cultivating tenants became owners of their leased-in holdings, subject to the ceiling provisions.

Nearly 54 per cent of Kerala's population depends on agriculture for their livelihood, as against 70 per cent for the whole of India. This does not mean that there is a high degree of industrialisation in the State. In fact, the State is less industrialised than the rest of India. Further, various services that are categorised as non-agricultural, form a superstructure over the inner core of agricultural activities. In other words, the economy of the State revolves essentially around agriculture.

Kerala has made notable achievements in health standards as reflected in the low infant mortality rate, low maternal mortality rate, low birth rate, low death rate, and high life expectancy that are far ahead of the national averages. The large size of the population, high levels of education and backwardness of industrialisation have thrown up a large army of unemployed persons, the majority of them having qualifications of secondary level and above.

Lack of employment opportunities in the State has compelled a large number of young persons to go out of the State to seek a living. It is estimated that about 11 lakh Keralites are working outside Kerala, of which about 80 per cent are in other countries. Remittances from these migrants are a major source of income in to the State.

Kerala continues to be a consumer State. Almost all the commodities for daily consumption are imported.

Change in land use pattern

The following Table 1.1 shows the change in the land use pattern that occurred in the State

during the past two decades.

Table 1.1 Land Use Pattern in Kerala 1995-'96 (Area figures in percentage)

Classification of Land	1975-76	1980-81	1985-86	1990-91	1995-96
1. Total geographical area	100.00	100.00	100.00	100.00	100.00
2. Forest	27.84	27.84	27.84	27.84	27.83
3. Land put to non-agricultural uses	6.67	6.94	7.17	7.65	8.31
4. Barren and uncultivable land	2.02	2.21	2.14	1.50	1.20
5. Permanent pastures and other grazing lands	0.51	0.14	0.11	0.05	0.04
6. Land under miscellaneous tree crops	2.17	1.64	1.29	0.89	0.83
7. Cultivable waste	2.92	3.32	3.23	2.43	2.12
8. Fallow other than current fallow	0.59	0.69	0.72	0.68	0.79
9. Current fallow	0.94	1.12	1.11	1.14	1.23
10. Net area sown	56.34	56.10	53.81	57.83	57.64
11. Total cropped area	76.72	74.25	73.77	78.32	78.46

Source: Department of Economics & Statistics, Kerala, 1998.

Out of the total geographical area of 38.85 lakh hectares, reserve forest accounts for 27.84 per cent. In the past 20 years, the extent of cultivable land has increased from 60.79 per cent to 61.78 per cent. Land put to non-agricultural uses has also increased from 6.67 per cent to 8.31 per cent. It may be explained that the increase in the utilisation of land has been made possible by substantial reduction in the area under miscellaneous tree crops, barren and uncultivable land, and permanent pastures.

The composition of the cultivable land has also undergone significant changes. While the net area sown has shown a marginal increase from 56.34 per cent to 57.64 per cent, fallow land has increased from 1.53 percent to 2.02 per cent. This shows that after reclaiming uncultivable land it is left fallow, presumably for use at a later stage for non-agricultural purposes. The emerging pattern shows intensive use of every bit of land that has potential for any kind of use.

The official figures do not present a full picture of the extent of deforestation and conversion of wet lands. As per official records, there are 10.81 lakh hectares of forest in Kerala. This forms about 27.8 per cent of the total geographical area. Forest forms a thick canopy of green cover and contained a variety of flora and fauna.

Starting from the 1950s, deforestation began initially because of allotment of forest land under the “grow more food” campaign schemes and, later, by encroachment by land-hungry people. Construction of dams and rivers required the opening up of roads through thick forests. Opening up of the forest areas facilitated unauthorised felling of trees and extension of cultivation even to interior forests. Unofficial estimates put the loss of forest cover to around 4 lakh hectares.

The total wet land (*nilam*) in Kerala, according to revenue records, is 5.74 lakh hectares. A study conducted by Kerala Statistical Institute in 1992-'93 shows that, only 3.33 lakh hectares remain as wet lands and is used for rice cultivation. Nearly 1.37 lakh hectares are now under perennial crops and 0.35 lakh hectares put to non-agricultural uses. These two together form nearly 30 per cent of the total wet lands in the State; and this entire area has been filled up and hence rendered unsuitable for rice cultivation. It has been found in the study that nearly two-thirds of this filling up of wet lands took place during the past two decades. It is also found that about 0.69 lakh hectares of wet lands are used either for annual and seasonal crops other than rice or left fallow. If proper efforts are made it may be possible to reconvert this for rice cultivation. This was the position in 1992-'93 and it is likely that the situation has further deteriorated since. The summary data on wet lands taken out from the study are given in the Table 1.2.

Table 1.2 Conversion of Wet Lands in Kerala

Pattern of Land Use	Area (in lakh hectares)	Percentage
1. Area classified as wet land (Nilam) (as per basic tax register)	5.74	100.0
2. Area under perennial crops	1.37	23.8
3. Area under non-agriculture uses	0.35	6.1
4. Area under annual & seasonal crops	0.49	8.5
5. Fallow land	0.20	3.5
6. Area under rice cultivation	3.33	58.1

Source: Conversion of Paddy land, Kerala Statistical Institute, Thiruvananthapuram, 1994

Table 1.3 Area under Important Crops (in '000 hectares)

Name of crop utilisation	1975-76	1980-81	1985-86	1990-91	1995-96
Net cultivated area	2189	2180	2191	2247	2265
Gross cropped area	2981	2885	2867	3020	3067
Rice	885	802	678	560	471
Total food grains	926	842	712	590	583
Tapioca	327	245	203	147	114
Sugar cane	8	8	8	8	6
Pepper	108	108	122	169	191
Arecanut	77	61	59	65	71
Banana/Plantain	52	49	43	66	74
Ginger	12	13	16	14	13
Cashew	109	141	138	116	103
Vegetables	33	31	27	22	21
Total fruit crops	317	346	323	353	363
Total food crops	1909	1778	1606	1496	1441
Coconut	693	651	705	870	914
Tea	38	36	35	35	35
Coffee	42	58	66	75	82
Rubber	207	238	330	412	449
Cocoa	-	24	17	12	8
Fodder crops	19	13	11	14	16
Total non-food crops	1072	1107	1261	1524	1626

Source: Department of Economics and Statistics, Kerala, 1998

Changes in Crop Pattern

The crop pattern in the State is quite different from that at the national scene owing to the topography and climatic conditions of Kerala. Perennial crops dominate the cultivated area in the State. Over the years, the share of perennial crops has been gradually increasing. Table 1.3 shows the change in the area under different crops since 1975-'76.

The share of area under rice has nearly halved during the past two decades. The area under tapioca, which is a cereal substitute, has also considerably declined, to about one-third. The area under vegetables has gone down to by nearly two-thirds. Among the crops that have expanded in area cultivated, the most significant is rubber which has more than doubled its area, followed by coconut and pepper which have increased their area by nearly one-third and three-fourths respectively. Thus, it will be seen that in the process of inter-crop adjustments, food crops in general are the losers and perennial cash crops, the gainers. The trend that has been persistent in the past two decades is continuing.

The area under crops given in the Table 1.3 may give the impression that they are raised as pure crops. Except rice and plantations crops, most of the other crops are raised under a multi-tier cropping system in and around the homestead. In most of the homesteads coconut is the base crop and other crops like pepper, plantain, arecanut, tapioca, and tubers are grown as inter- crops. Thus, one acre of coconut garden may contain, in addition to the coconut trees, 50 cents of tubers, 30 cents of plantain, 10 cents of pepper, 5 cents of ginger, etc. This mixed cropping system is destroyed when the land is used for rubber cultivation since no other crops grow under rubber trees. Earlier, rubber was grown only in the valleys and other areas where miscellaneous tree crops were grown. Most of the land recently converted to cultivation of rubber are those in the midland region where a variety of seasonal and perennial crops used to be cultivated. The mono-cropping system has thus affected the crop diversity in homestead farms.

The State has about 5.74 lakh hectares of wet lands, according to old village records. Nearly four lakh hectares of this area was being used for rice cultivation and a small portion for sugarcane, banana, and plantain, etc. The area under rice touched a maximum by mid-seventies, mainly through stabilisation of area under winter and summer crops. The physical area under rice has been continuously on the decline during the past two decades (Table 1.4).

Table 1.4 Change in Area under Rice Cultivation (Area in lakh hectares)

Season	1975-76	1980-81	1985-86	1990-91	19985-96
Autumn	3.97	3.49	2.80	2.36	1.87
Winter	3.84	3.54	3.13	2.59	2.25
Summer	1.04	0.98	0.85	0.65	0.60
Total	8.85	8.02	6.78	5.60	4.71

Source: Department of Economics and Statistics, Kerala, 1997

The physical area under rice is now only about 2.5 lakh hectares, and the decline continues. The rice land conversion usually takes place in three phases.

Most of the conversions start with the shifting of the area to cultivation of vegetables, banana and plantains, and tapioca; A portion of the land converted thus is later used for growing perennial cash crops like coconut, arecanut, and pepper. Earth brought from other dry land regions is used to fill these lands. Some of the converted areas are subsequently used for construction of houses and roads and are transformed into land put to non-agricultural purposes.

The emerging pattern of land use and crop pattern in the State thus shows the following features.

Area of wet land has declined considerably. A portion of the shift of wet land has been for non-agricultural activities. Of the remaining portion converted, a part is still available for re-conversion to rice. This is the area covered by seasonal crops. Perennial crops have already covered the rest. Thus, the overall effect of reduction of wet lands is the reduction of area under rice. Vast areas previously under a multiple crop system are now covered by a mono-crop system, thus reducing plant diversity. Perennial cash crops dominate the farm sector.

Causes & Consequences of the Change

Causes

The factors leading to these changes are complex both in themselves and in their interaction. Some of the proximate factors are:

(i) Demand for land for non-agricultural purposes: The activities in commerce, industry, transport, etc have risen with increase in population and changes in the socio-economic conditions of the people. This increase has led to rise in demand for land for construction of residential houses, shops, establishments, roads, etc. Since almost the entire available land in Kerala was already under some economic uses, the land required for non-agricultural activities had to be taken from cultivable areas.

(ii) State-intervention: The expansion of Government activities and the policies followed by successive Governments created conditions to which the farm sector had to respond. In the case of rice, the abolition of food zones and the distribution of rice at subsidised prices through fair price shops helped decline in open market prices. The fall in rice price together with the increase in wages of farm labour turned rice cultivation non-remunerative.

In the case of rubber, the development support given by Rubber Board through financial and technical assistance and the existence of an assured market for rubber provided the incentive for cultivators to bring new areas under the crop. Acquisition of land by Government for construction of roadways and railways and allotment of forest land for cultivation has also

affected the cropping pattern.

(iii) Technological changes: Spread of high-yielding varieties of crops, use of pesticides and fertilisers, substitution of men by machines, shortage of skilled workers, etc have influenced cultivation practices and crop pattern.

(iv) Increase in pressure on land: Due to increase in population, agricultural farms got subdivided and very small-sized farms became the order of the day. Since small-sized farms are not viable, the owners of these farms turned to other occupations for their livelihood. For such cultivators farming is only a subsidiary activity. They preferred to cultivate crops that require less personal attention.

(v) Neighbourhood aspects: Changes in the farming practices and crop pattern in the neighbouring areas induce other farmers to adapt to the changes. However, underlying all these has been the people's attitude to agriculture. For the older generation agriculture was a way of life; while for the present generation it is a commercial activity. The latter therefore, utilises it to earn as much money as possible at the minimum cost and in the shortest time possible.

Consequences

The immediate result of the change in the crop pattern is the reduction in rice production. The annual production came down to 9.53 lakh tonnes in 1995-'96 from 13.65 lakh tonnes in 1975-'76 despite the increase in productivity of rice cultivation. Consequently, dependence of Kerala on other States for rice has increased.

Rice-based farming system and cattle-rearing are inter-dependent activities. Sharp decline in the area under rice reduced the availability of straw which, in turn led to reduction in the number of draught animals and working bullocks in the farm sector, and to replacement of local variety of milch animals by high-yielding cross breed varieties. This development led to decline in the availability of farmyard manure and break down of the traditional farming sector.

Since most of the farmers prefer to keep rice lands fallow during summer, production of pulses, sesamum, sweet potatoes, etc have come down significantly. This change, together with reduction of area under tapioca, which is a cereal substitute, has affected the food availability for the poor adversely.

While increase in the area under cash crops like coconut, rubber, and pepper helped to increase farm income, changes in cropping-pattern in favour of perennial crops have an immediate and direct impact on the employment pattern in the rural area.

The shrinkage of rice cultivation and other seasonal crops has displaced agricultural labour especially women from the farm sector.

Although cultivation of perennial crops like coconut and rubber provided work to large numbers in the initial stages, it has not absorbed any sizeable portion of the farm labour displaced from rice cultivation. The change in the seasonal pattern of work has affected the rhythm of village life.

The change in cropping pattern has lowered the bio-diversity in the rural area. Not only does it affect the environment; it worsens the living conditions of the rural masses that depend on natural resources for their survival as well.

Moreover, in the context of globalisation of the economy and trade liberalisation, cash crops will have to face severe competition in the global as well as international markets. As the emerging crop-pattern is dominated by export-oriented cash crops spread over thousands of small holdings, getting effective control over the market forces will be a difficult problem for them.

Why A Location Specific Study

The factors leading to shift in land use and crop pattern and the consequences of the shift discussed above are those perceived mainly by professionals, experts, and administrators. Nevertheless, are the perceptions of the farmers the same as those of the professionals? What are their expectations and concerns? The reality may be somewhere between these two perceptions. On the other hand, both may be the same realities observed from different points of view. The priority concern of the professionals relates to production, cost and benefits, employment, poverty, etc.

Understanding of these phenomena helps to generate policies, programmes, and methods that are to be transferred to farmers for adoption. Non-adoption of them by farmers is attributed to their ignorance and imperfect communication. In recent years, criticisms have come up against this top-down approach. Explanations of non-adoption are to be sought not in the ignorance of farmers and not in the methods of communications, but in the technology itself, and the process through which communications are generated.

With this shift in understanding, alternative approaches that at the same time are complementary to the traditional methods have been evolved. These are usually described farmer-participatory approaches and seek to emphasise farmers' participation in most stages of the study. The present study is an attempt to understand the emerging farming system from the perception of the farmer.

Agriculture in general creates or alters micro-environments through various farm practices, micro-climatic effects of crop coverage, presence of natural resources, etc. Largely, the relationship among these components differs from location to location.

It is to understanding these relationships in the context of the changes in land use and cropping pattern that a location-specific study has been attempted.

2. Scope and Method of the Study

Objectives

The main objectives of the study are:

- (i) Identification of the factors for the changes in cropping pattern and farm practices that have taken place during the past two decades;
- (ii) Assessment of the impact of the change in cropping pattern on the socio-economic conditions of the rural community; and
- (iii) Studying the inter-relationship between depletion of natural resources and living conditions of the communities depending on them.

Method

In the study, two approaches have been used; (i) a statistical survey to assess the existing socio-economic condition of the population in the area, and (ii) a study carried out by a multi-disciplinary team with participation of local people using Participatory Learning Methods to understand how the local population perceives the changes in cropping pattern.

Statistical survey

The statistical survey was done using probability sampling method. It was aimed at collecting data to provide information on the following items.

- (i) Distribution of land holdings;
- (ii) Proportion of area under dry land, wet land and converted wetland;
- (iii) Distribution of households dependent on various types of farm activity;
- (iv) Cropping pattern, and income and expenditure pattern; and
- (v) Employment pattern of the population.

Sampling Method

A two-stage stratified sampling plan was adopted for the study. There were about 1600 households in the study area. From these, 500 households were selected to study the pattern of land holding and the extent of conversion. From these 500 households, a sub-sample of 100 cultivator households, 50 labour households, and 50 other households was selected for detailed study.

The sample was selected in two stages. In the first stage, the total number of households was grouped into clusters of approximately 50 households and from this, 10 clusters were selected by systematic sampling method. All the households in the 10 clusters were covered in the first stage of the survey.

For the second stage, the households selected in the first stage were grouped into four strata:

- (i) Farming households: Households with major share of income accruing from farming including livestock and poultry;
- (ii) Non-farming cultivator households: Households with major share of income accruing from non-farm activities and possessing 50 cents or more.
- (iii) Rural labour households: Households with major share of income accruing from wage-employment and in which the main earner is a casual labourer; and
- (iv) All other households: From each group, 50 households were selected by systematic sampling method for detailed data collection.

Two types of schedules, Schedule-1, and Schedule BII, were used for data collection.

Participatory Approach

This is an alternative to the conventional method of questionnaire surveys, successfully used in understanding local perception of the functional value of resources, processes of agricultural intervention and social and institutional relations. The methods used range from field-based visualisation to interviewing and group work. The common theme is the promotion of interactive learning, shared knowledge, and flexible but structured analysis. Participatory approach can bring together different disciplines to get an integrated vision of livelihood and well being.

Participatory approach has three broad advantages.

- (i) The information it provides tends to be highly accurate. This is partly because local people's knowledge of local conditions is often greater than that has been supposed, and partly because it allows local people to discuss and crosscheck local conditions.
- (ii) Plans drawn up by local people themselves are more likely to work than plans drawn by outsiders; and
- (iii) Participatory nature of the process is a development benefit in itself, in terms of empowering local people.

In the present study, even though the approach was mainly participatory, some of the techniques of Rapid Rural Appraisal have also been used for data collection activities. The RRA/PRA methods may broadly be classified as visualised analysis, methods for interviewing, and methods for group and team work.

Some of the methods used in the study are local analysis of secondary data, direct observation, semi-structured interviews, transect-walk, key probes, time line, trend analysis, seasonal calendars, case studies, linkage diagrams and livelihood analysis. A multi-disciplinary team involving local people did the participatory study.

3. The Study Area and Its Resource Base

The Study Area

The study was conducted in a hamlet of Pallichal panchayat, is a rural area in Nemom Block, Thiruvananthapuram district.

Pallichal panchayat is a suburb of Thiruvananthapuram city. It has an area of 21.70 sq. km with a population of 38,896 people as per 1991 census. The topography of the panchayat consists of hills, valleys, plains, and low-lying wet lands. Agriculture is the main means of livelihood of the people; a small percentage of the population is engaged in non-agricultural activities like handloom weaving, pottery, quarrying, and petty trade.

About 30 years ago the panchayat had nearly 280 hectares of double crop rice fields, but now the area has shrunk to about 40 hectares. The conversion of rice fields is an ongoing process. In many places, the conversion is done initially for cultivation of banana, plantain, tapioca and vegetables, but later, for planting perennial crops.

Although the canal from the Neyyar Irrigation Project passes through the panchayat and provides water for irrigation in some places, cultivation is mainly rain-fed. There were 66 ponds spread over various places of the panchayat, but now only 49 are in existence and most of them are in a desolate condition. Some of the canals from these ponds have altogether disappeared.

In the garden lands, a variety of perennial crops like coconut, arecanut, jack, mango, and pepper are grown. Cultivation of tapioca that was one of the major seasonal crops in the dry land has now shifted to the wet lands. The cropping pattern in the panchayat is given in the Table 3.1.

Table 3.1 Area under Crops in Pallichal Panchayat 1996-97 (in hectares)

Name of Crop	Area	Name of Crop	Area
Rice			
I Crop	40	Cashew	5
II Crop	40	Pepper	5
Pulses & grams	10	Banana & Plantain	115
Tapioca	85	Vegetables	25
Coconut	720	Rubber	140
Arecanut	3	Other Crops	274

Aralummoodu situated at a distance of 5 km from the panchayat is the major market for exchange of farm produce. Pravachambalam, Naruvammoodu, and Punnamoodu are three minor markets in the panchayat.

The Panchayat has a Krishi Bhavan and a veterinary hospital. Farmers Service Co-operative Bank and branches of some commercial banks function in the panchayat area. The national highway N.H.47 and Thiruvananthapuram-Kanyakumari railway line pass through this panchayat. A general profile of the panchayat is given in the box 3.1.

Box 3.1 General Profile of Pallichal Panchayat *

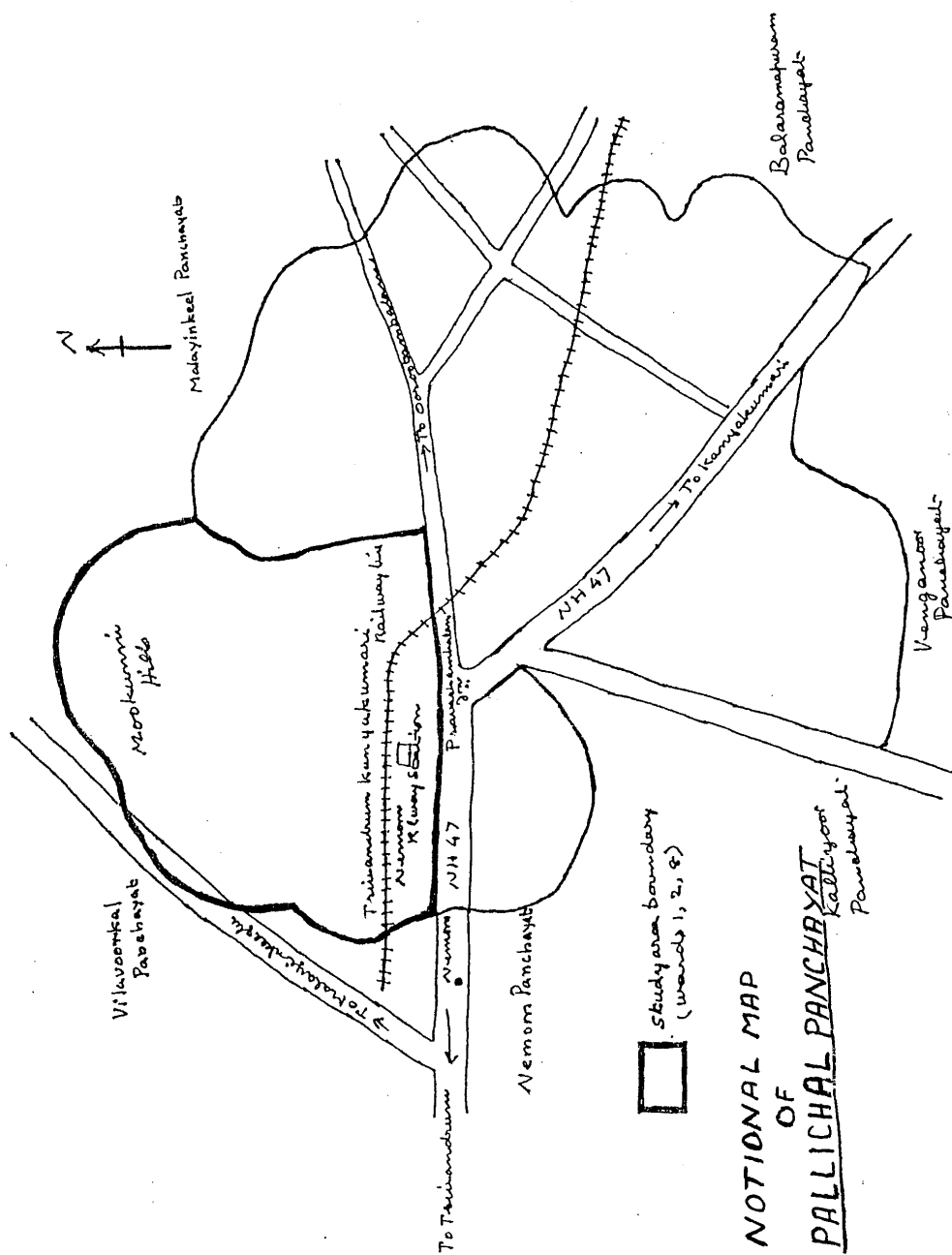
1. Name	- Pallichal	12. Primary health centre	- 1
2. Block	- Nemom	13. Private health centre	- 12
3. District	- Thiruvananthapuram		
4. State	- Kerala	14. Anganvadi	- 15
5. Area	- 21.70 sq.km	15. Roads	
		i) Bitumen-surfaced-	27.9 km
		ii) Unsurfaced	- 84.73 km
6. Population	-388976(1991 census)	16. Cultivable land	- 1488 ha
			(excluding govt. land)
7. SC population	- 5610	17. Wet Land	- 278 ha
8. ST population	- 22	18. No. of cultivators	- 1240
9. Density of population	- 1792/sq.km	19. No of agricultural labours	- 4754
10. No of wards	- 14	20. No. of irrigation tanks	- 49
11. No. of schools		21. Length of irrigation canals	-
60.6 km			
i) UP schools	- 2		
ii) LP schools	- 6		
iii) High school	- 3		
iv) Unaided school	- 6		

The study area is a hamlet of almost 5 sq. km. spread over ward nos. 1, 2, and 8 of this panchayat. The location of the hamlet is shown in figure 3.1.

It is bounded on the west and north by Nemom, Vilavurkal, and Malayinkeezhu panchayats and on the east by ward 3 of the Pallichal panchayat. The road from Papanamcode to Malayinkeezhu touches the north-west corner of the study area tangentially at Papanamcode. The hamlet is only about 8 km from Thiruvananthapuram city and is accessible by both rail and road. The Mookunni hill on the northern side of the hamlet dominates the landscape.

A string of rice fields starting from the eastern boundary of the hamlet and running down to the north-west corner divides the area into two distinct zones, the Mookunni hill area on the northern side and the main land, Edacode, on the southern side. The Mookunni hill rises to about 250 metres above sea level and its highest portion is earmarked for installing a radar station. The Mookunni hill area can be reached by Papanamcode-Malayinkeezhu road through the western side and Pravachambalam-Mookunni hill road by the eastern side. The middle portion of the Mookunni area is, however, cut off from the mainland and is only accessible by footpaths crossing the rice fields. Although the hill is the common border between the study area and Malayinkeezhu panchayat, there exists no direct access between the two areas because of the steep hill that stands in between.

16



The Land

The topography of the study area is undulating with slopes and valleys, rolling hills interspersed with low-lying wet lands. The land slopes down from the high hill area in the north to the rice fields, rises and falls in roller coaster fashion trapping small sections of rice lands in between and gradually rises and reaches a plain area bordering the railway track and the national highway (Generalised transect Figure 3.2).

Nearly 50 years ago, the area covered by the hill was completely under the Government ownership. During the Second World War, the Government earmarked about 50 hectares of land from the area for establishing a firing range for the army. From the eastern side of the hill, an adjacent area of about 80 hectares of land were distributed for cultivation to ex-servicemen and unemployed persons during the 1950s. During the 1970s, about 60 hectares adjacent to the firing range were acquired and handed over to the military. Another 20 hectares of land have gone for the railway track. In addition, there are some other patches of Government land used for roads, canals, tanks, etc. Only private individuals hold the remaining area (of about 350 hectares), (Figure 3.3). Of this, the wet land area is about 60 hectares.

The soil in the hamlet ranges from laterite to clay. The hilly areas are mainly rocky with laterite and red soil in between. In the valleys, a mixture of coarse sand with red soil is seen. However, in the level grounds and light slopes, red soil, coarse sand, black soil, and white soil are observed. Clay and sand with rich alluvial soil are found in the low-lying plains and wet land areas. In the wet lands lower down, the soil is mainly clayey and is used widely for pottery.

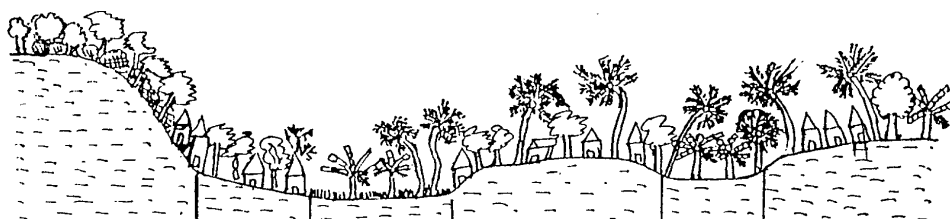
Forest

About 50 years ago, Mookunni hill area was a reserve forest covered with a dense growth of valuable timber like teak, rosewood, and mahogany. It was also a habitat for a variety of birds and animals like wild fowl, kite, kingfisher, woodpecker, owl, monkey, jackal, porcupine, wild boar, wild rabbit, krait, and python. These forests were one of the main sources of green manure for rice cultivation, firewood for the poor, and fodder for cattle. It is said that these hills had a sober influence on the climatic condition of the valley. The destruction of the tree cover which started in the 1950s has denuded large portion of the hills and exposed it to vagaries of the sun, the rain and the wind, which have adversely affected the soil, the climate, and the livelihood pattern of the people.

The hill now consists mainly of trees planted under the social forestry scheme, rubber in the plantations on private lands and other trees grown naturally in the deforested areas.

The land acquired for railway purposes had remained under private ownership and consisted of rice lands and garden lands with cash crops and a variety of fruit trees in them. Government felled all these tree crops after acquisition and land on the sides of the railway line was planted later with acacia and eucalyptus under the social forestry scheme.

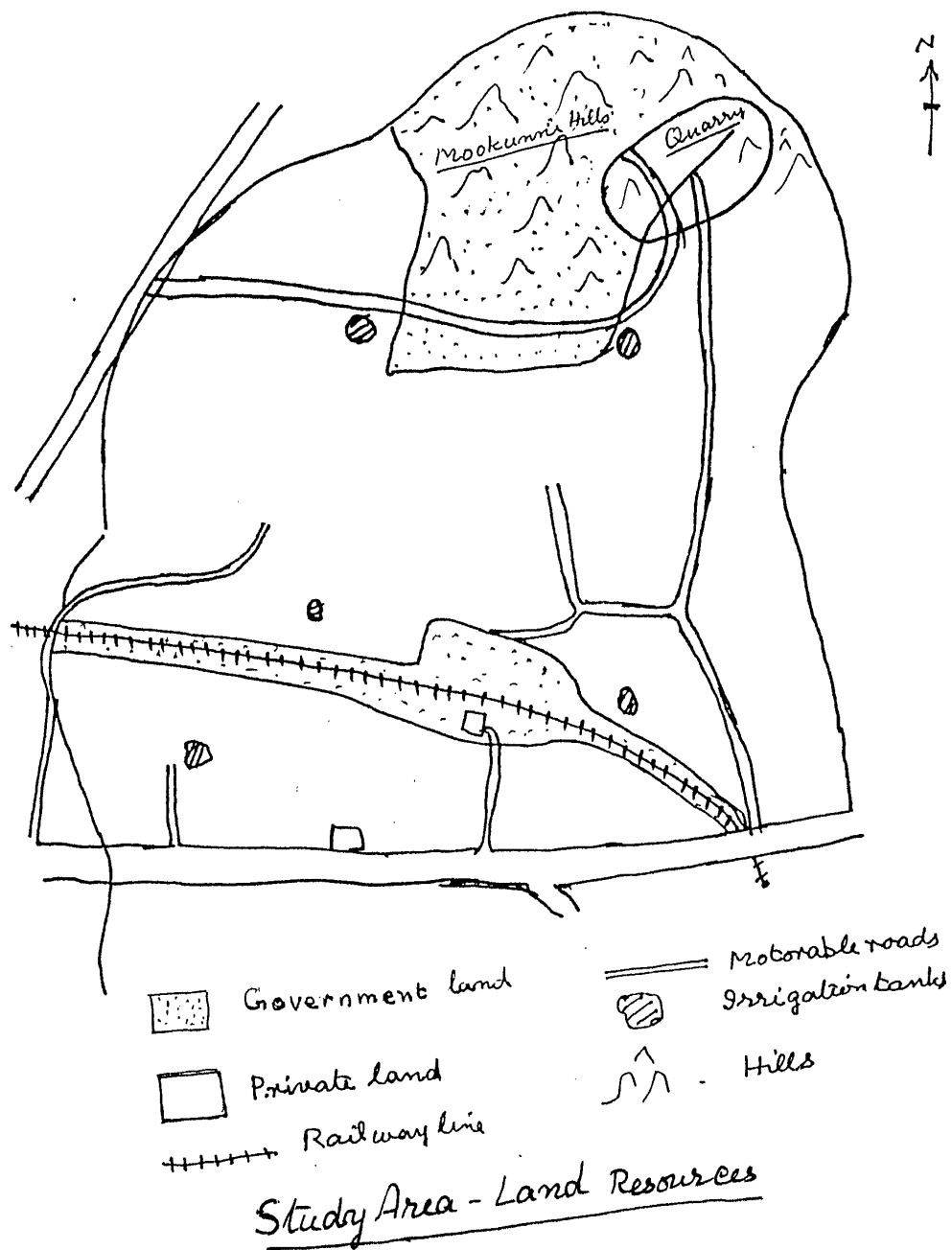
Figure 3.2 Generalised Transect of Study Area



<u>TERRAIN</u>	Hills	Valleys & slopes	Wet land	Slopes and level grounds	Wet land	Slopes & plains
<u>SOIL</u>	Rocky, forest soil	forest soil & laterite	Clay, loam	laterite and red soil	Sandy & Sandy clay	laterite and red soil
<u>WATER</u>	streams	streams, ponds, deep wells	ponds & Canal water	deep wells	ponds & Canal	deep wells tap water
<u>VEGETATION</u>	Natural tree growths Rubber	Social forestry Rubber, pepper, fruit trees	Rice , banana, tapioca, Vegetables, tubers, Coconut	Coconut, rubber, tapioca, axee nut, pepper, tree crops, social forestry	Banana, tubers, Coconut, Vegetables	Coconut, pepper, plantain, tapioca, tree crops
<u>LIVESTOCK</u>	-	goat, poultry	-	Goat, poultry cows	-	Cows, poultry
<u>HABITATION</u>	Isolated huts	S/c colonies settlers, Rural labour low density	-	All communities Scattered houses Semi pucca & pucca houses Farmers and rural labour	-	Scattered houses of all communities Mainly pucca houses Densely populated presence of muslim community
<u>LIVELY - HOOD PATTERN</u>	Quarrying, collection of forest produce	Farming, rural labour, pottery	-	Farming, rural labour, livestock rearing, services	-	Farming, non-agricultural activities mainly services
<u>PROBLEMS</u>	Pollution ducts, Crushers, Soil erosion	Illicit distillation, Water Scarcity lack of roads	large scale conversion of rice fields	Water scarcity in summer Mosquito menace, fuel shortage Inadequate latrine facility Shortage of farm labour	Total conversion of paddy fields	Mosquito menace Non availability of farm labour

Generalised Transect of Study Area

Figure 3.3 Land Resources in the Study Area



About four decades ago there existed a number of sacred groves and woods, some under individual ownership and others held as common property. These formed the habitat for a variety of flora and fauna. Some of these groves were sources of perennial springs and rare medicinal plants and herbs. The groves and woods under private ownership have been destroyed. As for those under common property, a few remain but are facing obliteration due to indiscriminate encroachment. These changes have affected the ecological balance of the area adversely.

Water

The cultivators in the hamlet depend on the monsoon rain and the Neyyar Dam for their water requirements. Cultivation in garden lands is mainly rain-fed while that in the wet land region gets irrigation water through feeder canals from the dam. Earlier there were about 11 tanks in the area used for irrigation and for bathing. Now only six of them are in useable condition. The tanks in Mookunni hill area that get the run-down water from the surrounding hills dry up in summer.

On the other hand, the tanks in the Edacode mainland are fed from the Neyyar Irrigation canal. There is full of water in the tanks throughout the year. In addition to these tanks, the irrigation canal provides water during the summer season to the fields in the mainland. The major beneficiaries of this tank-canal system are the cultivators of the wet land area.

People depend mainly on wells for drinking water. However, most of them dry up during summer. The wells situated near to the irrigation canals are recharged when the canals are opened. Recently, tap water has reached the panchayat at some centres by the side of the village road. A notional sketch of the water resource is shown in Figure 3.4.

Infrastructure

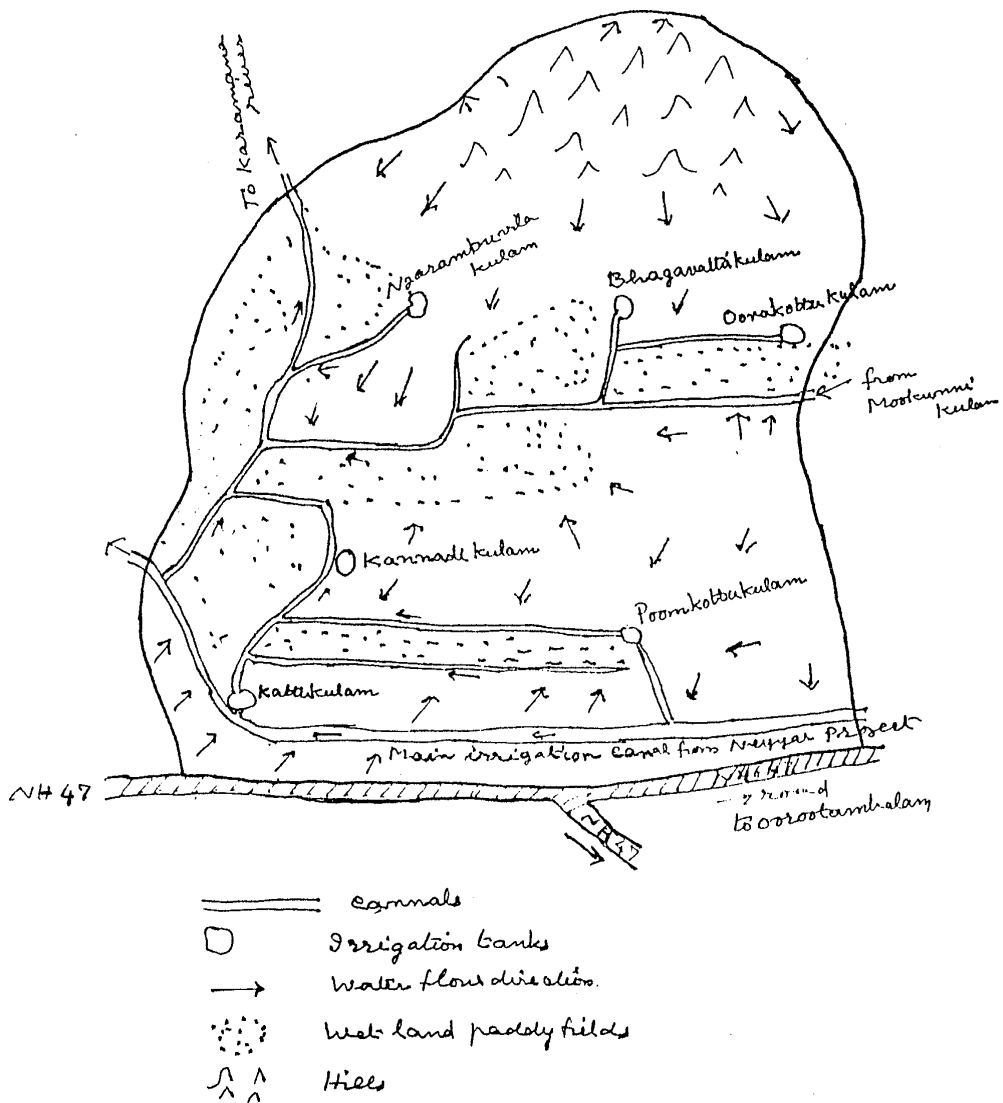
The hamlet is linked to Thiruvananthapuram city, and Balaramapuram and Neyyattinkara towns, with a well-developed transport system of road and rail. However, within the hamlet, only lanes and footpaths link most places.

The area is electrified. Most of the houses including those of Scheduled Castes in the Edacode main land have electric connection. On the Mookunni hill region, only a few houses are electrified though lines have been drawn and energised. In the entire area, about 80 per cent of the houses has electricity.

There are a few houses with telephone connection in the Edacode area. However, no public telephone facility is available in the hamlet.

There are two high schools, one for boys and the other for girls, and three lower primary schools in the hamlet.

Figure 3.4 Study Area-Water Resources



Study Area - Water Resources

People

The hamlet covers about one-fourth of the area of the panchayat and has a population about 8,000 and about 1,600 households. Compared to the Edacode main land, the Mookunni hill region is sparsely populated. Nearly 50 per cent of the households belong to Hindu forward communities, mainly *Nairs*, and another 10 per cent is households of Scheduled Castes, mainly of *Pulayas*. The remaining 40 per cent consists of Muslims and other backward communities like *Nadars*, *Velars*, and *Ezhavas*. A few households of *Villukurup*, dhobi, barber, and carpenter communities also exist. The *Pulley* and *Velar* communities mostly live in separate colonies, while the habitats of other communities are intermingled. However, segregation on caste or community basis is unheard of in the area and the people live in perfect harmony.

4. Socio-economic Profile of Households

As mentioned earlier, for the purpose of analysis, we have classified the households in the study area into four groups based on their main source of income: farming households, non-farming cultivator households, labour households, and other households.

The percentages of households in the four groups are given in Table 4.1.

Table 4.1 Distribution of Households by Occupational Categories

Category of households	Percentage of households	Percentage of households	Average household size
Farming	6.4	6.15	4.28
Non-farming Cultivator	10.2	9.70	4.25
Labour	50.4	51.55	4.54
Others	33.4	32.60	4.40
All	100.00	100.00	4.45

The average household size is 4.45; the size varies from 4.25 in non-farming cultivator households to 4.54 in labour households. All are nuclear households. Joint family system has totally disappeared from the area.

The number of persons engaged in agriculture and allied activities are comparatively low though it is a rural area. May be due to the proximity to urban centres, quite a few households have members employed in Government/quasi-government institutions and engaged in non-agricultural activities. Table 4.2 gives the distribution of the local population according to activity.

Table 4.2 Percentage Distribution of Population according to Activity Status

Activity	Male	Female	Total
A. Working			
1. Farming	4.24	1.37	2.74
2. Rural labour	23.85	11.82	17.55
a. Agricultural labour	8.10	5.22	6.60
b. Other rural labour	15.75	6.60	10.95
3. Unorganised Trade, Transport & Commerce	10.00	-	4.80
4. Organised Sector	8.38	4.02	6.06
5. Others	10.00	3.60	6.65
A. Sub-total	54.67	20.81	37.80
B. Employment seekers	5.65	7.54	6.64
C. Outside labour force	37.88	71.65	55.56
D. Total	100.00	100.00	100.00

Source: Survey data

It was found that 44.4 per cent of the population is in the labour force, of which 37.8 per cent is workers and 6.6 per cent employment seekers. The remaining 55.6 per cent is persons outside the labour force consisting of students, housewives, persons too young and too old, sick, etc.

Among the working population, about 71 per cent are males and 29 per cent are females. The work participation rate of females is thus very low at 21 per cent as against 56 per cent for males. Only about one-fifth of the working population is engaged directly in agriculture and allied activities.

Other rural labours constitutes about 30 per cent of the working population. Though rural labour and agricultural labour are categorised as separate groups, their activities often overlap and basically they form a common category; thus agricultural and non-agricultural rural labour together comprise about 54 per cent of the rural working population. It is significant that about 16 per cent of the working population is employed in the organised sector earning regular wage or salary.

In this study, the well-being of population is assessed based on two characteristics, namely housing and income.

About 45 per cent of the residential buildings in the area are pucca and 35 per cent are semi-pucca. Nearly 11 per cent can be considered old and dilapidated; and the remaining 9 per cent are huts and temporary sheds. About 93 per cent of the houses of cultivator families (farming and non-farming) are of the pucca or semi-pucca type, and the remaining are old *tharavadu* ancestral houses. Surprisingly, even among the rural labour households, about 64 percent are pucca or semi-pucca. The percentage distribution of households according to type of house and category is given in the Table 4.3.

Table 4.3 Percentage Distribution of Households by Type of House

Category	Pucca	Semi-pucca	Old & dilapidated	Temporary sheds/huts	All
Farming	5.4	0.4	0.6	-	6.4
Non-farming	8.0	1.6	0.6	-	10.2
Rural labour	9.2	23.0	10.0	8.2	50.4
Others	22.4	8.0	2.0	0.6	33.0
All	45.0	33.0	13.2	8.8	100.00

Source: Survey data

About 73 per cent of the houses has either water-sealed or bore-hole latrines; only 10 per cent has open pits as latrines. The remaining houses have no latrine facility at all. About 90 percent of the pucca and the semi-pucca houses is electrified. Among the old houses and huts about two-thirds are electrified with at least one light point in each of them.

About 80 per cent of the houses use water from their own well and another 10 per cent water drawn from neighbours' wells. A few houses situated near the roads use the public taps. Some houses in the hill region depend on streams and ponds. However, during the summer months there is scarcity of drinking water in most parts of the hamlet.

Household income levels vary widely. The highest income group is the farming households followed by the non-farming cultivator households. The lowest in the rung is the labour households.

The average annual income of the four categories of households namely farming, non-farming cultivator, rural labour, and other households were estimated to be Rs 72,300, Rs 57,900, Rs 24,600, and Rs 36,300 respectively (Table 4.4). The averages do not reveal, however, the real situation since there is wide disparity in incomes from household to household even of the same category. The income distribution in the village is highly skewed with a large number of households having low income and a few house-

holds having high income (Table 4.5). At the top level, nearly 13 per cent of the households get more than Rs 60,000 per year and about 2 per cent more than Rs 1,00,000. At the same time, about 22 per cent of the households earn less than Rs 20,000 per year. The percentage distribution of households according to annual income is given in Table 4.5.

Nearly 81 per cent of the farming households have income from non-farm sources also. In fact, 40 per cent of their income comes from non-farm sources. In the case of non-farming cultivators, 19 per cent of their income is from the farm sector. Because of land reforms, almost all the labour households possess some land though very small; the income from these plots is not substantial. From the survey, it was found that their income from own land contributed to only 4 per cent of their income.

Table 4.4 Average Net Income per Household (1996-'97)

Category	Average Income per households (Rs.)	Percentage of Income from non farm land
Farming	72300	60
Non-farming cultivator	57900	19
Rural Labour	26400	4
Other households	36300	3

Source: Survey data

Farm Size and Crop Pattern

In this hamlet, nearly 40 per cent of the households are directly involved in agriculture either as cultivators and or as farm labour. Among the cultivators, nearly 40 per cent are dependent mainly on farm, while the others have their main income from sources other than agriculture. Nearly cultivators hold 70 per cent of the land. The distribution of holdings according to the different categories of households is given in Table 4.6.

The agricultural land may broadly be classified as wet land (*nilam*), converted wet land, and dry land (*purayidam*). Nearly 17 per cent of the cultivable land is wet land, but nearly 60 per cent of this has been converted for dry land crops and for non-agricultural purposes.

As mentioned earlier, about 350 hectares ie 70 per cent of the total area is under private ownership. Nearly 17 per cent of this area was double-crop rice lands. About 58 per cent of this area has by now been converted and used for cultivation of crops like banana, tapioca, and coconut (Table 4.7).

Table 4.5 Percentage Distribution of Households by Annual Income

Income group (in Rs. '000')	Farming households	Non-farming cultivator households	Rural labour households	Other households	All
Less than 20	3.1	4.0	27.4	24.2	22.4
20-30	21.9	11.8	50.8	24.2	36.2
30-40	6.2	11.8	11.1	15.2	12.2
40-50	9.4	15.7	7.1	12.1	9.8
50-60	3.1	17.6	3.6	9.1	6.8
60-70	12.5	13.7	-	12.1	6.2
70-100	21.9	17.6	-	3.1	4.2
Above 100	21.9	7.8	-	-	2.2
All	100.0	100.0	100.0	100.0	100.0
Percentage of households	6.4	10.2	50.4	33.0	100.0

Source: Survey data

In the dry lands, a variety of crops like coconut, arecanut, rubber, pepper, banana, and tapioca are grown. In the wet lands, vegetables and sometimes pulses are cultivated in the summer season.

The rubber plantations are mostly seen in the valleys near the Mookunni hills. Recently rubber cultivation has extended to the mainland region also. The present crop pattern in the area is given in Table 4.8.

Cultivation is carried out in the form of mixed crops in the field, though in Table 4.8 areas are shown separately for cultivation of each crop as at present. For instance, in most of the plots, a variety of crops like coconut, arecanut, pepper, jack, and mango are grown. Among the tree crops, mono cropping is followed only in the case of rubber.

The mixed crop pattern has helped in spreading the risk of crop failure and price fluctuations. The average cost of cultivation per acre of land is estimated around Rs 10,400 per annum.

Nevertheless, it varied substantially from farm to farm, but remained mostly within a range of Rs 6,000 to Rs 14,000. One interesting feature found in the study was that the average farm expenditure per acre is independent of the size of the farm. It was found that the net income per acre has no significant relation with the size of the farm.

Table 4.6 Percentage Distribution of Households by Holding Size and Category of Households

Holding size (in cents)	Farming	Non-farming cultivator	Rural labour	Other household	All
0-10	-	-	34.0	14.6	48.6
11-49	-	-	16.4	18.4	34.8
50-100	0.8	7.2	-	-	8.0
101-250	2.8	3.0	-	-	5.8
251-500	2.4	-	-	-	2.4
501 & above	0.4	-	-	-	0.4
All	6.4	10.2	50.4	33.0	100.0
Average holding size (cents)	239	86	11	15	35

Source: Survey data

Table 4.7 Percentage Distribution of Cultivable Land according to Type of Land Possessed

Category of household	Type of Land			
	Wet land	Converted wet land	Dry land	All
Farming	5.5	3.5	35.2	44.2
Non-farming cultivator	1.6	5.0	18.7	25.3
Rural labour	-	0.6	15.3	15.9
Other holds	-	0.7	13.9	14.6
All	7.1	9.8	83.1	100.0

Source: Survey data

Table 4.8 Area under Different Crops (in percentage)

Crop	Area
Rice	18.0
Coconut	40.7
Arecanut	0.1
Pepper	1.5
Banana	4.3
Tapioca	12.4
Tubers & vegetables	1.6
Rubber	38.8
Other tree crops	3.5
Gross cultivated area	120.9
Net cultivated area	100.0

Source: Survey data

In the converted wet fields, the usual practice is to grow tapioca or banana in the first instance to raise one or two crops after that and finally to plant coconut saplings.

In the dry lands, cultivation is mainly rain-fed. In the wet lands, canal and tank irrigation is used for rice during the second crop; however, for banana and vegetable cultivation, irrigation is resorted to in the case of each plant with water fetched manually from tanks or canals.

Livestock

Only a very few houses raise livestock and poultry though this is a rural area. Mainly cultivator households maintain milch cows. The survey showed that while 43 per cent of the cultivator households has milch cows, the corresponding percentage among the rural labour and other households is only 6 per cent. However, nearly 20 per cent of the labour households rear goats. Poultry rearing is not considered an important occupation, even though about one-third of the households own two or three fowls. During the study, it was noticed that not even a single household owned draught animals (ox or buffalo).

Other major economic activities

Apart from agricultural and allied activities, the major occupations in the region are pottery, quarrying, and construction. There are also a few petty trading units like tea-shops, pan shops, and provision shops. In the Mookunni hill region, there are some youngsters engaged in illicit brewing and distillation of arrack.

The clay in the wetlands of Pamamcode is suitable for pottery. Pottery had remained a thriving activity in this area for several decades but now it is on the decline.

The eastern parts of the Mookunni hill are rocky. The increase in construction activity in the Thiruvananthapuram district and the development of approach roads to quarry sites has made quarrying a major activity in this area. In addition to local people, workers from outside the village also are employed here.

Potters of Pamamcode in trouble

Velar community of Pamamcode in Pallichal panchayat has engaged themselves in pot making for centuries. This community is also known as *Kusava*. They claim to be the descendants of the “Universal Creator *Brahma*”, the creator of all beings.

Earlier, the potters here had high levels of employment and high returns on their products. However, today only a handful of families is engaged in this traditional activity and they are fighting a grim battle for survival. Social and economic changes created circumstances adverse to their traditional occupation forced them to give up pot-making and seek greener pastures elsewhere.

Lack of proper market for their products, and steep increase in the prices of clay, firewood and hay are reported to be the main reasons for the decline. Earthenware had to give way to steel, aluminium, and alloy-metal utensils that found a place of pride in the households notwithstanding their high prices and the health hazards they pose.

Making earthen pots needs a lot of skill and is a highly labour-intensive activity. The returns to the potters are too meagre when compared to the toil involved. Today the younger generation has found that the returns are not proportionate to the efforts, and hence refuses to take up pottery for livelihood. Clay pot-making is likely to face extinction in the near future.

5. Changes in Pattern and Farming System

The discussion in this section is based on the analysis of situations, problems, and strategies carried out by the multi-disciplinary study team with the participation of local people. The discussions did not take place exactly in the sequence in which the findings are presented in this section but were carried out at different points of time with different groups shifting backward and forward and often taking up the same subject matter in different contexts. Consequently, the perceptions of various groups often differed. However, the study team has attempted to construct the multiple realities emerging from the differing perceptions.

During the initial discussions, it became clear that the constructed figures on area under individual crops do not represent the real crop pattern, particularly in the case of perennial tree crops. Therefore, the study team had to depend more on the qualitative aspects, which emerged during the discussions, of changes in crop pattern.

Changes in Crop Pattern

The agricultural system in the area can broadly be classified into two categories, those carried out in the wetland zone and those in the dryland zone. About three decades ago, cultivation meant cultivation of rice in wetlands. The crops in the dryland zone were mostly natural growths and were used as supplementary items for home consumption or inputs for rice cultivation in the wetlands. The changes in crop pattern that took place during the past three decades have two aspects: (i) the conversion of rice lands for cultivation of other crops and for non-agricultural purposes, and (ii) active use of dry land for cultivation.

The study area has about 60 hectares of wetlands, in which two crops of rice used to be raised. During summer, in some of the paddyfields pulses or sesamum used to be raised as a third crop. Cultivation during the first crop was mainly rain-fed, while during the second crop, water from small ponds and streams was also made use of. The area under rice has now shrunk to about 25 hectares, as a result of conversion of wet land for cultivation of tapioca, banana, vegetables etc (Figure 5.1). In these converted lands, planting of coconut, arecanut, and other tree crops is carried out. The conversion continues; and the cultivation of pulses as third crop has now been discontinued since the farmers prefer to keep their paddy land fallow during the summer season.

In the dry land zone, most of the land earlier belonged to a few families. The holdings were large and contained a variety of trees like mango, jack, tamarind, cashew, Anglia, and pun. The tree cover could be described even as woods with little human habitation in them. Coconut and arecanut were grown on the bunds bordering the wetlands, around homesteads and on low-lying areas. Growth of population and break up of the joint family system resulted in fragmentation of holdings and more intensive use of lands in the dryland zone. The old trees were felled either for construction of houses and/or for clearing the land for cultivation of cash crops. The owners of small plots of land preferred to grow a variety of crops around their homesteads. In the earlier pattern, there had been a multitude of big trees with thick undergrowth of different species of plants and shrubs. The pattern that emerged is that of a mixture of young tree crops like hybrid varieties of mango, jack and coconut with pepper, plantain, tubers etc as inter-crops. During the years following the Second World War, tapioca was a major cultivated crop in the dryland zone. Tapioca cultivation has now been shifted to the converted paddyfields.

With the passage of time the sacred groves and the many woods that formed habitat for a variety of flora and fauna have disappeared. Also small ponds and springs around the wetlands have been filled up and used either for cultivation or for non-agricultural purposes.

In the Mookunni hill region, cultivation of rubber started in the early sixties. In the following years, rubber plantations spread to most parts of the cultivable land in the hill region replacing

the traditional tree crops. The practice of planting rubber is now gaining popularity in the mainland zone also.

The land acquired by the Government for military and railway purposes had contained a variety of fruit trees and cash crops. After acquisition, all of them were felled and the area is planted with acacia and eucalyptus under the social forestry scheme.

From the group discussions, it emerged that the crop pattern, that is, the lay out of different crops, is not the result of a purposeful design but a consequence of various unplanned events. What happened and why, can be interpreted only by reconstructing the sequence of events in time. The impacts of events were different for different pieces of land and for different farmers; and the final picture that emerged is the sum total of the adjustments made by decision-makers under varying circumstances. The sequence of important events in the study area that have had impact on the agricultural system, as the local people see them, is illustrated in Figure 5.2.

The impacts of major events are indicated below:

(i) Deforestation of Mookunni hills: These hill areas had provided firewood and fodder to the rural poor and green manure to the cultivators. Deforestation restricted the supply of these materials. Allotment of a portion of the hill area to private parties led to the growth of rubber plantations.

(ii) Modernisation of agriculture: This started with the inflow of irrigation water from the Neyyar Irrigation Project in the late 1950s. Pulses replaced third crop rice. Use of improved varieties and applications of fertilisers, pesticides, etc increased rice yield and created substantial marketable surplus.

The introduction of high-yielding varieties in the mid-sixties further increased rice yield. The H.Y.Vs could not maintain, however, their initial yield levels. Higher levels of application of fertilizer and pesticide were necessary to slow the decline in yields. Consequently, costs went up and profitability declined. Why profitability did decline to the extent it did is not clear, though pests, diseases, chemical toxicity, chemical deficiencies, etc could be possible explanations (Figure 5.3).

(iii) Shooting up of rice prices: The mid-sixties witnessed steep increase in rice prices resulting in higher profitability for paddy cultivation. Wetland prices increased. Transactions of paddy lands were continually on the increase because of which further fragmentation of holdings ensued.

(iv) Land acquisition: Government acquired large chunks of land for military purpose and for rail-road construction. The mounts that the displaced persons received by way of compensation were used largely for purchase of alternative land site, mostly drylands. Therefore, dryland prices went up.

(v) Public distribution system: The supply of adequate quantities of rice and wheat through public distribution system introduced by the Government by the mid-1970s stabilised their

Figure 5.1 Paddylands and other lands in the study area (based on maps prepared by farmers' group)

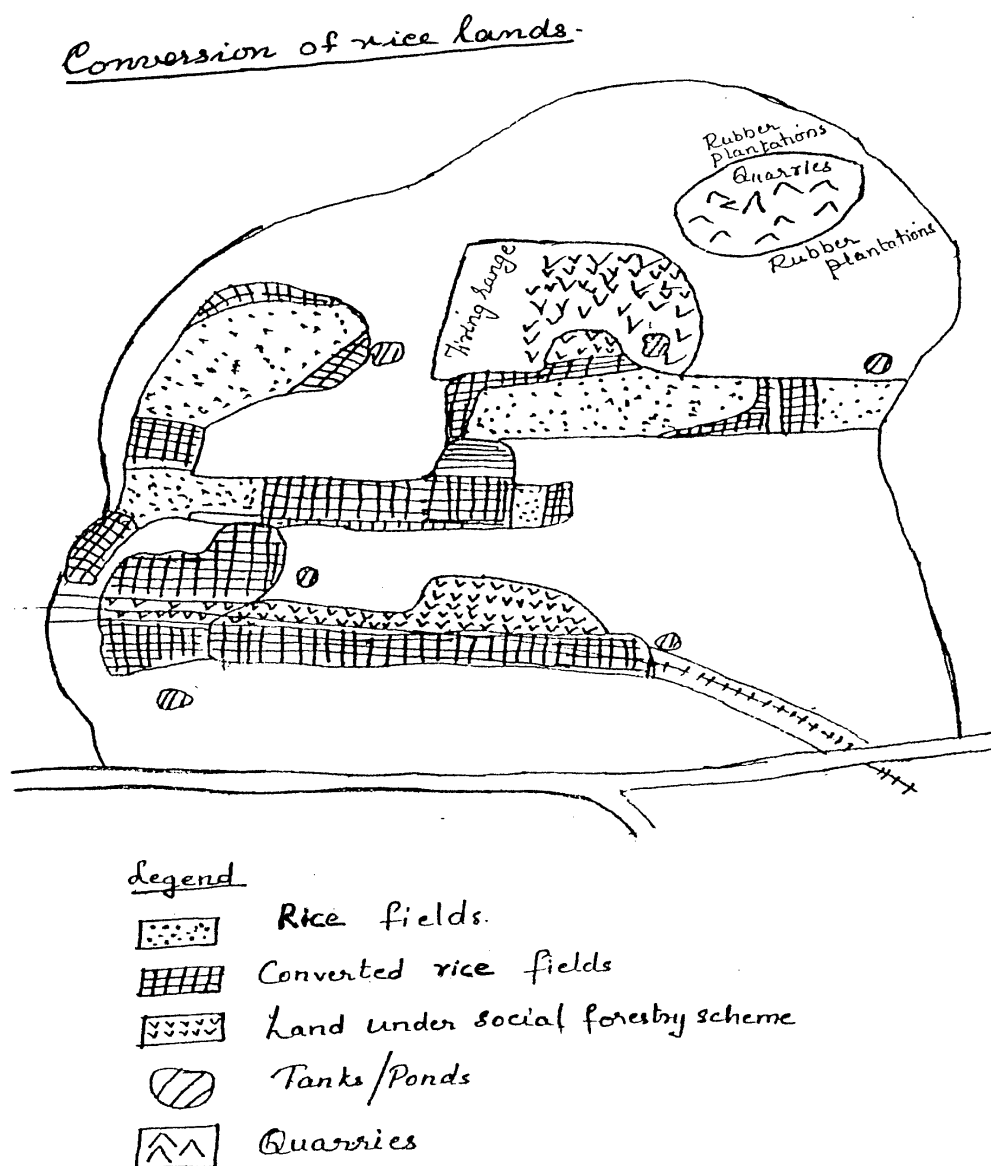
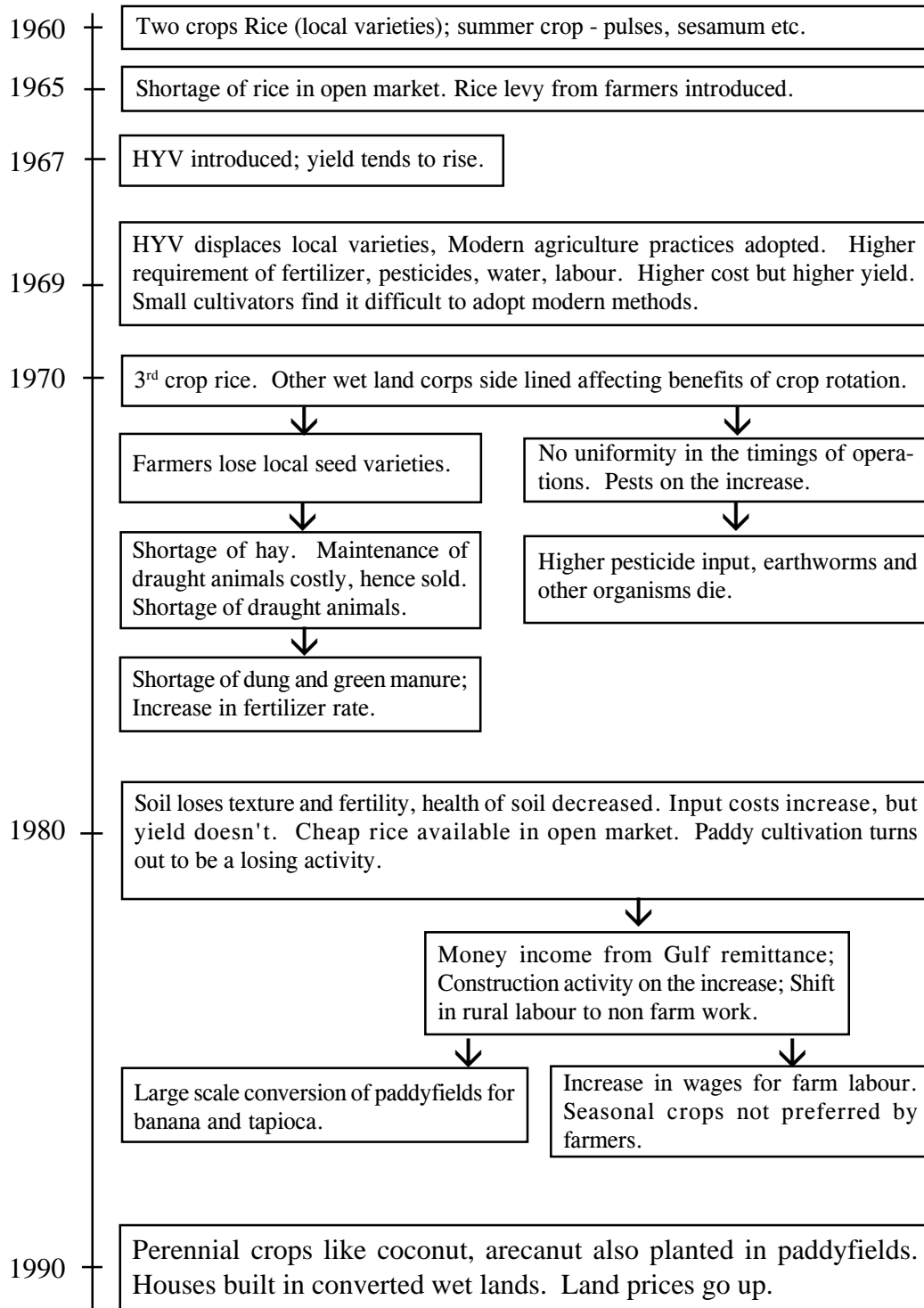


Figure 5.2 Transect of Important Events

	<i>Events</i>
1940	Firing range established in the Mookunni hill area. Restrictions for collection of firewood and grazing of livestock construction of Mookunni hill road.
1945	Large scale tree cutting in Mookunni hills; consequent on auctioning of forest trees by Government.
1947	Extension of firing range area.
1950	Government land in Mookunni hill area distributed to ex-service men and unemployed persons for cultivation.
1952	Settlers from Central Travancore introduced rubber cultivation in the hill area.
1955	Introduction of improved varieties of rice.
1956	Parts of village electrified.
1964	Rice prices shot up. Boost to rice cultivation. Many farmers switched on to high yielding varieties.
1969	Land reforms. Agricultural labourers got right of ownership for 'Kudikidappu' lands.
1970	Acquisition of private land for construction of railway track. Displacement of residents, mainly agricultural labourers.
1975	Construction work for railway line started.
1979	Establishment of Nemom railway station and commencement of railway traffic.
1980	Acquisition of private lands near Mookunni hills for military purpose. Displacement of residents, mainly small farmers and agricultural labourers.
1984	Acacia and eucalyptus cultivation in lands acquired for railways and military purposes.
1985	Spread of rubber cultivation.
1986	Large scale conversion of rice lands started.

Figure 5.3 Modernisation of Rice Cultivation - A Historical Transect



open market prices, while the input prices for rice cultivation continued to rise. Paddy cultivation turned out to be unprofitable.

(vi) Construction of railway track: Construction of the railway track across the paddyfields bifurcated them and restricted the flow of water from the northern zone to the southern zone. Planting of acacia trees under the social forestry scheme hindered direct sunlight on the paddy fields, thus affecting yield adversely. Paddylands on either side of the railway track were converted to other crops and a chain reaction followed, as shown in Figure 5.4.

Changes in Farming System

The change in crop pattern cannot be seen as a phenomenon isolated from the change in the farming system as a whole. In fact, the change in the cropping pattern is only a symptom of a deeper malaise. To understand the farming system it is necessary to examine not only crop production but other factors like ownership pattern, access to natural resources, employee-employer relations, livelihood strategies, farming practices and cultural factors as well. Although the participatory study started with analysis of change in crop production, the discussion led to other aspects of the farming system in an effort to find answers to causes and consequences of crop pattern.

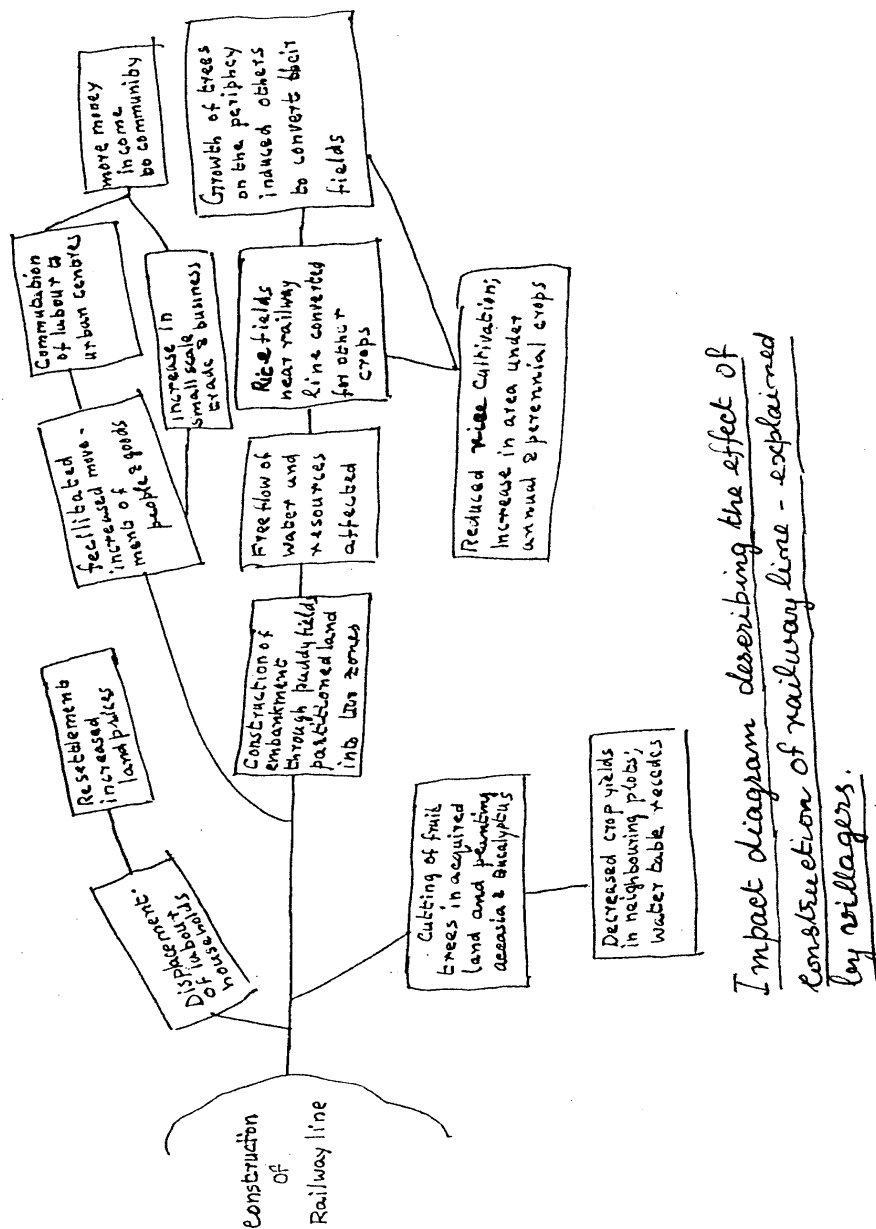
Process of Change

The community in the study area about five decades ago was almost entirely self-reliant with agriculture as their main activity and all the other activities supporting it. Most of the land belonged to a few prominent forward caste families, which followed the joint-family system. Cultivation was mainly confined to paddy. Each cultivator household had a few attached labourers belonging to the *Pulaya* community, a Scheduled Caste. These attached labourers were as much involved in cultivation as the members of the cultivator households themselves were. All members of the labour households, except children and very old persons, usually worked together in the paddyfields. In addition to providing regular labour, they helped the cultivators in all agricultural and allied activities. Paddy, being a short-duration crop, needed not only a variety of timely operations but close personal attention also. The attached labour families provided these services. In return, they received cash wages and food as well as part of the harvest for the various crop-related activities.

The cultivators used own paddy seed for cultivation; the varieties to be sown in each season were decided by consensus among farming households. From experience they found that sowing of compatible varieties could reduce the incidence of pests and at the same time retain the purity of the varieties. All cultivators maintained their own draught animals and often pooled them to speed up the cultural operations. The thick vegetative growth in the garden lands, farmyard manure and wood ash available in the cultivator households provided sufficient fertiliser for the paddy fields.

Besides farm labour, all services supporting agricultural operations were available within the village. There were families of village carpenters, blacksmiths, local healers for cattle diseases, barbers, dhobies, potters etc whose activities revolved around the paddy farming sys-

Figure 5.4 Impact diagram describing the effect of construction of railway line:
explained by villagers



tem. A major part of the remuneration paid to the services rendered by these families used to be paid in rice. Further, the artisans received a small portion of the harvest as token of their involvement in farm operations.

The post-harvest operations, like threshing of hay, winnowing and de-husking, were attended to by women, who received wages as rice. Thus, at the end of the harvest season, while the granaries of the cultivator households would be full with rice, there would be some stock also with the labour households which would suffice to meet at least their needs for two to three months.

In the lean months of June-July, subsidiary items of food like jack and mango were available in plenty in the village. During the Second World War period and the years that immediately followed, cultivation of tapioca was done extensively in the uncultivated dry land plots. While this activity fetched the much-needed cash to cultivators, the labour households found tapioca a wholesome food when taken in combination with fish.

All the farming households had at least one pair of draught animals (buffaloes) and one or two cows. The younger members of the attached labour households looked after the draught animals, while the family members tended the cows themselves. The lower slopes of the Mookunni hills, the paddyfields after harvest and the uncultivated drylands were used for grazing cattle. Straw was available in plenty and maintenance of cattle was easy and cheap. Green manure and cattle dung together provided adequate manure for the paddyfields. Cattle-rearing was thus part of the paddy-based farming system.

The system as it existed then may be considered a typical peasant economy in which needs were limited. Cultivation was done as a way of life rather than as a commercial proposition. Leaving paddylands fallow was considered unethical and undignified, while cultivation in the dryland region was not common. Even well-to-do farmers were often short of cash and had to borrow in times of urgency.

Changes in this traditional system began in the late fifties. Almost all the joint families partitioned their properties in anticipation of the impending land registration, even though a few continued to carry on their cultivation activities on a joint family basis even after partitioning. With the spread of education, spatial mobility of the work seekers, particularly the educated, increased; out-migrants tended to settle down in the places of their work outside the village. They no longer had any interest in paddy cultivation and were ready to sell away their lands.

When the average size of the agricultural holdings became smaller due to partitioning and land sales, the volume of work in each holding diminished and the traditional type of relationship between cultivator and attached labourer broke down. For most of the cultivators, agriculture became a subsidiary means of livelihood. Since paddy cultivation requires close attention, retaining paddyfields became a strain on small cultivators. Even then, for some more time, they continued to cultivate paddy as the availability of rice in the open market was low and prices ruled high.

Increase in population, break up of the traditional joint family system, rise in income from non-agricultural activities and inflow of remittances from abroad led to a spurt in construction activities. Big trees like jack, Anglia, and mango that fetched attractive prices as timber for construction began to be felled and sold in ever increasing numbers. In the open spaces formed by removal of trees, tapioca was cultivated extensively. The acquisition of private land (during the 1970s) for railways and military purposes displaced large number of households, especially those belonging to the rural labour.

At the same time, it brought liquid cash to the community, generating new demand for dry land residential purposes. A large number of semi-pucca houses in small plots sprung up in the Edacode mainland. In the new homesteads were cultivated A variety of tree crops like coconut, hybrid varieties of mango, jack, and guava were cultivated in the new homesteads.

In consequence, the density of population and density of trees are found to go together. In places where population is dense and the farms small, the number of trees per unit area is found high. Not only did the gross quantity of biomass increase, the increase itself was largely the result of a conscious effort. Trees were planted and protected by small farmers for a variety of reasons like ensuring rights to land and trees, need for tree products, and opportunities for sale of timber and the usufructs.

By the beginning of the 1970s, less educated rural labour also started moving to other places in search of work. Proximity to urban centres, availability of cheap transport and attractive wages in the non-agricultural sector were factors that promoted mobility. Out-migration of rural labour reduced the supply of agricultural labour in the village further and pushed up farm wages.

Shortage in the supply of farm labour was keenly felt during the harvest season. It is said that the wages for harvesting a *para* of paddy land (approximately 14 cents) which had remained at about 10 kg of rice has gone up to 40 kg (Figure 5.5). More than short supply, it was the difficulty in getting timely labour for the farm operations, especially for rice cultivation, that constituted an insuperable problem for farmers. For small cultivators, rice cultivation turned out to be a formidable and losing activity. In addition to the non-availability of timely labour, there were other reasons as well for the decline in rice cultivation such as the following:

- (i) Small cultivators were not able to maintain draught animals and so had to hire them for farming operations. However, the number of cultivators maintaining cattle diminished year by year.
- (ii) With the clearing of land under miscellaneous trees, green manure became scarce. The supply of farmyard manure declined with the decrease in the cattle population.
- (iii) Paddy cultivation calls for close personal attention. Most of the cultivators were engaged in non-agricultural activities outside the village and consequently personal attention became difficult.

Figure 5.5 Economics of paddy cultivation

(Prepared on the basis of discussion with local farmers)

Extent of paddyfield : 42 cents (3 *paras*: local measure)

Cost

1. Nursery level :		
Field preparation 2 Males	Rs.	375
Seed: / <i>para</i>	Rs.	60
Woodash	Rs.	75
Levelling, manuring & sowing 1M + 1F	Rs.	195
	Rs.	505
2. In transplanted field :		
Ploughing : if tiller is used	Rs.	375
if by bullocks	Rs.	1350
Levelling, strengthening boundary : 3M	Rs.	375
Manure 30 baskets FYM + Fert	Rs.	660
Labour + transport	Rs.	375
Transplanting : 2 M + 6 F	Rs.	670
weeding : 6 F	Rs.	420
	Rs. 2500 + 375	
	(or + 1350)	
3. Harvest & Post harvest operations		
Harvest : payment in kind : 24 <i>Kottu</i>	(24 x 0.6 = 14.4 <i>para</i> paddy)	
Threshing : 12 <i>Kottu</i> (7'2 <i>para</i> paddy)		
	Total 22 <i>para</i> paddy	
	Drying of straw : 1 M -	Rs 125
<u>Total expenses</u> : Cash:	Rs. 3504, if tiller is used	
	Rs. 4408, if bullock used	
Kind :	22 <i>para</i> paddy	
<u>Yield</u> Net Yield :	30 <i>para</i> \pm 10 <i>para</i> paddy	
	valued at Rs 1500 (at Rs 50/- per <i>para</i>)	
	straw worth Rs 1500	
Total :	Rs. 3000 \pm 500	

(Cultivator's contribution not valued)

The village deity also feels the pinch of rice shortage

The paddy harvest in the village would be over by March-end and the granaries of farmers become full. The succeeding summer months of April and May are the traditional festival season. During this period the crown (*mudi*) of the village deity is taken out of the temple and placed in a temporary thatched shed known as *pacha panthal*, built in a harvested paddyfield. The deity is then taken in procession along village lanes to visit the households during which they offer rice as *nira-para* to the deity.

Now that the paddyfields have all but a few, been converted, the site of the *pacha panatal* is shifted to the roadside. The traditional route of the procession has also changed from the lanes alongside the paddyfields since the households of the farmers have no longer rice to offer.

All these factors together contributed to decrease in the interest on the part of farmers for paddy cultivation. An additional reason was the sharp increase in the market price of converted wetlands. With the prospects for getting high land prices, some of the paddy cultivators began a process of conversion of wetlands in stages.

First, they switched on to crops like tapioca and banana in the paddyfields; after a year or two coconut saplings were planted in the converted land. Though, initially there were mild objections from neighbouring farmers and labourers, the dissenting voices eventually subsided. The conversion of paddy land has hindered water flow and sunlight in the rice fields that remained. In course of time, other paddy cultivators also took to conversion.

In the garden lands taken up for cultivation, farmers try to maintain diversity of crops and develop a variety of cropping strategies. From experience they have found that in the long run coconut is the crop best suited for cultivation under local conditions, as it allows raising of various inter-crops like banana, tubers, plantain, and pepper. Coconut responds favourably to cultural operations and unlike paddy, once it starts yielding does not require close attention.

The inter-cropping system provides farmers with a range of outputs; it represents a logical approach to coping with variable environments. The total value of the yield from mixed crops is often greater, particularly if root and shoot formations of coconut allow these crops to use light, water, and nutrients efficiently. Inter-cropping not only diminishes the incidence of pests and weeds, but reduces water loss and soil erosion by providing greater ground cover as well.

Rubber, though a high-income-generating crop is usually cultivated only in inferior lands like slopes and rocky areas. Since no other crops can be raised in a rubber plantation, rubber cultivators are exposed to a high degree of risk arising from price fluctuations.

Farmers in the village are of the view that rubber plantations affect cultivation in neighbouring lands adversely by reducing sunlight and depleting soil nutrients.

Some of the farming households maintain milch cows of improved breeds, kept most of them within cowsheds and fed on purchased feeds and fodder grown in the farm and crop residues. Maintenance of cows not only augments farmers income, but also provides farmyard manure for improving nutrient supply and soil structure. Rearing of milch cattle is emerging as a significant component of the crop system in small farms.

Certain important indicators of the change in the farming system, prepared based on discussions with local farmers are shown in Figure 5.6. With the shift from seasonal crops to annual and perennial crops, there has taken place a decline in the demand for local labour in the agricultural sector and a gender shift in employment opportunities, from women to men. In the paddy-based system, women worked side by side with men in all farm operations from planting to harvesting. The post-harvest operations like winnowing, drying, and threshing were attended to entirely by women. Agricultural labourers had farm or farm-related work almost throughout the year, except in the months of July and August (Figure 5.7).

With reduction in the area under paddy cultivation, job opportunities for women in the agricultural sector have diminished. For agricultural operations in the dry land areas and in the converted paddy lands, males are preferred.

Difficulty in getting farm labour for timely agricultural operations has been pointed out by some of the farmers during the discussions. The younger generation in the area does not like to soil their hands by doing physical work in land and water. It is pointed out that the spread of education accompanied by the growth of the idea that manual work is below human dignity, has turned the young generation idle. The over-riding ambition seems to be to get white-collar jobs.

Associated with the transformation in the farming system, visible changes have appeared in the life style of rural people. Household consumption of the previous generation depended mostly on home-grown items and items produced in the village. For agriculture also, inputs like manure, seed, labour and draught power were generated internally or acquired through exchange in terms of commodities or labour.

Now farm people consume less and less of own produce and depend increasingly on products purchased mostly from the non-agricultural sectors. The farmer does not wish to become a better farmer, but only a better spender. The additional income accruing to him is spent not for land improvement or soil or water conservation, but for purchase of household appliances, building materials, other capital and consumer items and for entertainment. People in general have become more money-minded; and non-farm people have more money than farmers have. There is a shift from farm to non-farm occupations and as a consequence the number of part-time farmers and ex-farmers are in the rise.

Figure 5.6 Historical transect showing changes in farm sector (based on group discussions with farmers of Edacode village)

*Historical Transect showing changes in farm sector
prepared in a group discussion with local farmers*


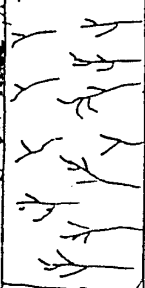
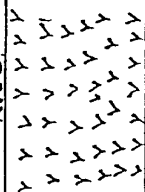

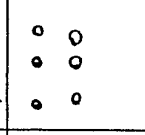

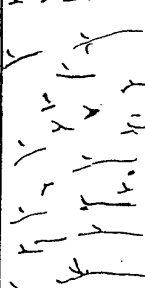
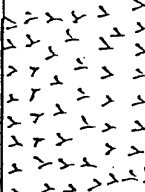
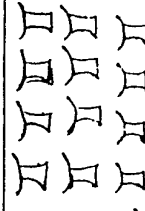
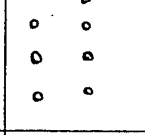

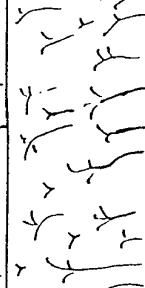
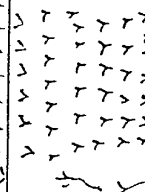
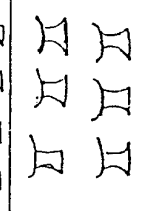
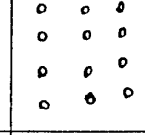
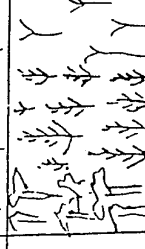
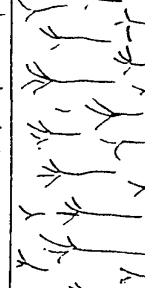
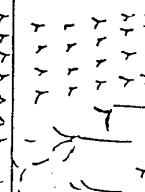
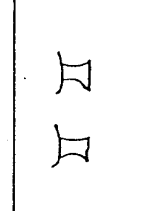
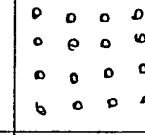
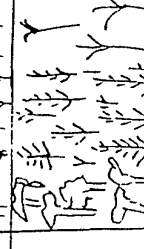
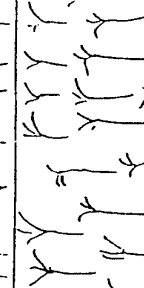
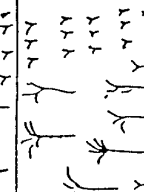
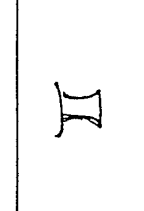
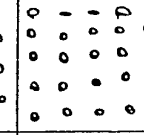
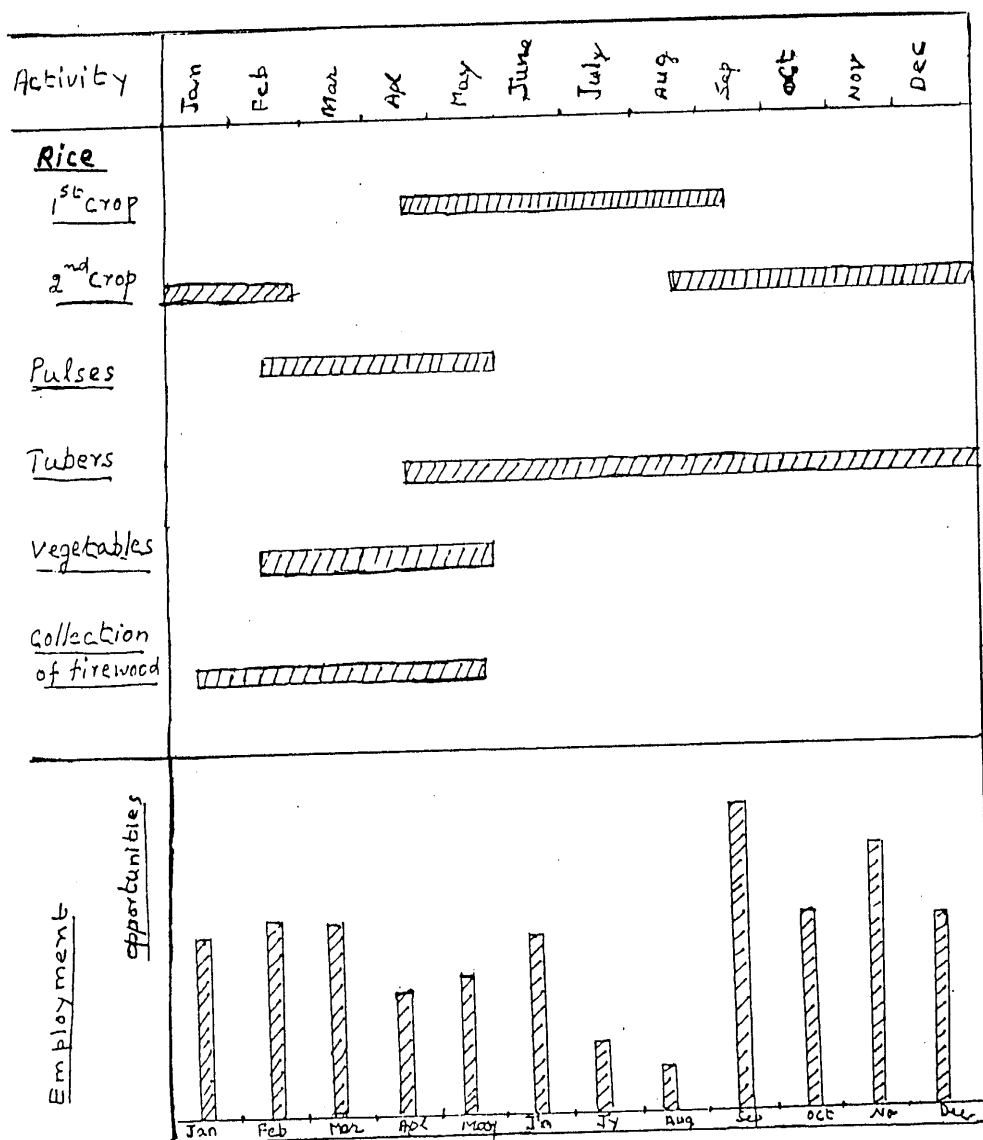
Year	Forest	Agriculture (Wheat, Rice)	Rice	Livestock	Yield
1940					
1970					
1980					
1990					
Now					

Figure 5.7 Sesonality of agricultural operations and employment in paddy-based farming system (based on discussions with village elders)

Seasonal calendar of Agricultural operations and employment in rice based farming system; based on discussion with village elders.



6. Causes and Consequences of Change in Cropping Pattern

As explained in section 2, two approaches were attempted in this study: (i) a statistical survey to understand the current scenario and (ii) a participatory analysis with local people to explore the changes that have taken place in the agriculture sector during the past three to four decades and to identify the causes and consequences of the change. The data collected in the survey appeared to be objective. The study team analysed them and interpreted the results, of course, against their social and professional background. The inferences appeared to be logical, though not flawless. Nevertheless, when the results were presented to the local people during discussions, their interpretations varied widely. Different individuals and groups had different perspectives on what the problems were and what constituted a shift in the farming system. The study team then realised that what they were after was only a part of the problem. In the discussions, the resolution of one problem usually led to the raising of another problem situation and the process went on. The second point the team noticed was that the problems were always open to different kinds of analysis and interpretation. There were different perspectives of the same situation and the interpretation depended on the knowledge and involvement of the participants and on the assumptions made. The responses suggested that the explanations and inferences were changeable and open to different interpretations depending on the beliefs and attitudes brought in.

In such a situation, the study team was faced with the problem of identifying the truth behind the opinion. Are the explanations trustworthy? Which explanations were to be accepted and which to be rejected? It was also noticed that it would not be possible to ask all the right questions, let alone find the right answers. Towards the end of the participatory analysis, the team realised that each individual and group approached the problem and saw the truth as it mattered to him or them and each explanation was part of the truth.

The individual causes and consequences selected and included in this report are those that the team felt would cover most of the points of view expressed in the participatory analysis. It is to be pointed out here that the individual causes and consequences listed here do not stand in isolation, but are inter-related. The rural scenario is complex and is changing continuously, the consequences becoming causes for further change.

Causes

Population growth and change in family structure

The population in the hamlet has almost doubled during the past three decades. The break up of the traditional joint family system and partitioning of the old *tharavadu* properties completed by the early seventies. Increase in population and partitioning of households has resulted in fragmentation of holdings and rise in the demand for new dwelling units. The spread of education and the increase in communication facilities opened the rural society to outside forces. One of the consequences has been the decline in the average household size due primarily to adoption of family planning. Each household, of four to five members, chose to have an independent house of its own with a small homestead around it. In order to construct new houses, and also to raise the required financial resources for construction, old trees like

jack, mango, *anjili* and *punna* standing in their homesteads happened to be cut down. In the open space so formed, new house buildings were put up and in the homestead a variety of new crops were raised, preference being given to cash crops and ornamental crops, such as orchids.

About three decades ago the prominent families in the areas were paddy cultivators and the old *tharavadu* houses stood on the slopes of nearby paddyfields. Rural life revolved around cultivation of paddy and related activities. The houses of rural labour were also located near the paddyfields. There were a few households of traders and hawkers, etc especially of the Muslim community, alongside the highway. Most of the dry land area except homesteads remained uncultivated with green cover all over and lots of old trees and a thick under-growth of a variety of shrubs. For the older generation, land especially paddy land was constituted cultivable land. The new generation, especially the educated, is after jobs outside agriculture and give only secondary importance to cultivation, the least being to rice cultivation, and prefers to construct dwelling units alongside motorable roads and lanes. A net work of lanes has come up, particularly in the Edacode mainland zone. As a result, new houses stand in this area cheek by jowl causing disturbance to the eye, in the place of the earlier serene scene of trees and plants.

State Intervention

Effect of land reforms

Prior to the implementation of land reforms, almost all the agricultural labourers lived in mud huts built on their landlords' lands. With the implementation of land reforms, they got ownership right of the *kudikidappu* (hutment dwelling); however, in most cases, they move away, by mutual consent, to other, more remote places for the convenience of the landlord who offered them incentives to move away, in the form of promises to give or larger areas of land than their hutment dwellings. Most of the plots given to them were wastelands which they later reclaimed to habitable areas through strenuous efforts. The trees that they planted on these lands were cash crops like coconut, arecanut, and pepper.

Land acquisition

During the seventies, the Government acquired private land for military purposes and for construction of railway track, displacing a large number of households mostly belonging to rural labour. Amounts paid to them by the government by way of compensation for the lands acquired, brought liquid cash in large sums into circulation in the area. New demand for land arose for resettlement of the displaced households, a development that led to rapid increase in the price of dry land. The new settlements altered the existing crop pattern. The lands acquired by government contained a variety of fruit trees, shrubs and woods, which have since been cleared. Most of the area has since been brought under the social forestry scheme.

The embankment constructed across the paddyfields for laying the railway track hindered free movement of people, cattle, and water along their earlier courses. In fact, the embankment has partitioned the single stretch of paddy lands into two zones. After the first phase of

acquisition, there came another government notification for a second instalment of acquisition for the railways. Since the price fixed by the government for dry lands was higher than that for the wetlands, the owners anticipating high prices hastily converted the paddyfields near the railway track into dry land. The expected land acquisition did not materialise, but the converted lands did not revert to paddyfields.

Deforestation

Forests and woods had been the main source of supply of green manure for paddyfields and fodder for cattle. They also were a source of supply of firewood to the rural poor. Destruction of forests cut this major source away. Cultivators had then to depend more on external sources of supply, as the result of which cost of cultivation went up. Increase in the cost of cultivation is said to be one of the reasons for the shift from paddy to other crops.

Strengthening of public distribution system

In the mid-sixties, because of the establishment of food zones and restrictions imposed on the inter-State movement of rice, the availability of rice in the open market in Kerala declined considerably. Interest in paddy cultivation revived for a while. It was during this period that the State Government introduced high yielding varieties of rice and supported modernisation of agriculture. Rice production received a further boost that lasted until the mid-seventies. By this time, the public distribution system became strong and the restrictions on movement of rice were reduced. Rice at moderate prices became available in the open market. This development worked to the disadvantage of paddy cultivation.

Neighbourhood effects

In the large stretches of paddyfields, there had existed certain pockets, which were of inferior quality for various reasons such as water logging and salinity. During periods when rice prices went high, these areas were used for paddy cultivation, although the yield was poor. With slump in rice prices, they would be left fallow. In course of time, these lands happened to be converted for cultivation of crops such as tapioca and banana. Eventually, all those lands have come under coconut cultivation. Planting perennial crops on these lands has affected paddy yields in the neighbouring fields adversely with the result that they also were got converted into coconut cultivation. A chain reaction thus ensued.

In the Mookunni hill area rubber plantations were raised as early as in the mid-fifties. For nearly three decades, rubber cultivation was confined to this area. The first planting of rubber in the mainland region of Edacode began in the mid-eighties. The success of this experiment motivated other cultivators to follow suit. Most of these plantations exist in inferior quality lands.

Modernisation and Commercialisation of Agriculture

Paddy cultivation witnessed technological changes during the mid-sixties by way of high-yielding-variety seeds and chemical fertilisers and pesticides. This modernisation package

increased the yield by two to three times. Even in traditional varieties, application of chemical fertilisers and pesticides increased the yield considerably. Most of the HYV seeds were short-duration varieties. This combined with the fact that water became available in summer due to the coming up of the Neyyar Dam and its channels had the effect of raising a third crop of paddy replacing pulses, which was earlier used to be sown during summer.

In the traditional farming system, all the cultivators in a locality carried out planting and harvesting operations simultaneously, thus reducing the incidence of pest attacks by effectively breaking their life cycle. In the modernised system, there was no uniformity in the timing of planting and harvest, with the result that the pests could complete their life cycle in different farms where the paddy crop was at different stages of growth. This latter practice necessitated application of higher doses of pesticides. Increased use of fertilizers and pesticides and non-availability of organic manure affected the micro-organisms and other life forms in the field and reduced the texture and quality of the soil. In consequence, high yields obtained during the late 1960s and 1970s could not be sustained. Together with these changes, the wage rates for agricultural labour witnessed rapid escalation. Several farmers switched back to traditional varieties of paddy; their yields however, remained lower still with the result that paddy cultivation as a whole became unprofitable.

In the traditional system, agriculture had revolved around paddy and the cultivation was done mainly for home consumption. Paddy was also the exchange medium for meeting most of the household requirements. The subsidiary items of food, fuel, etc and inputs for crops raised on garden lands provided paddy cultivation. As the economy became monetised, the consumption pattern changed with greater dependence on the use of purchased goods. This change expanded the need for cash income in the community. Therefore, the purpose of cultivation changed from production for household consumption to production for the market. The cultivators therefore chose to cultivate those crops that yielded higher cash income in the long run.

Labour Problems

In the traditional system of agriculture in which land remained in the hands of a few households, each cultivator family had one or two attached labour households, which provided male and female labour for agricultural operations. In addition to providing labour for routine operations, they arranged additional labour to meet the peak demand at times of sowing and harvesting. This system had worked efficiently and was advantageous to both the cultivator and the labourer. With the fragmentation of holdings, the system broke down and the cultivator had to go in search of casual labourers for each farm operation. Getting suitable farm hands in time for the farm operations became a problem to small holders, especially those engaged in paddy cultivation, which called for constant attention.

The transition of the economy from agriculture to non-agriculture, growth of urban centres in the neighbourhood, and growth of facilities for quick transport induced movement of labour from the village to outside areas in search of work. Availability of farm hands for timely operations declined. After the eighties, the area witnessed a spurt in non-agricultural activi-

ties like construction, transport, and trade in and around the village. The higher wages existing in the non-agricultural sectors and the preference of the workers to work in sectors other than farming shifted a sizeable proportion of the rural labour away from agriculture. The supply of labour for agriculture, especially for paddy cultivation, fell drastically in consequence.

Increased educational facilities extended the period of schooling and delayed the entry of younger generation to the work force. The new entrants who are better educated than their elders preferred white-collar or non-manual jobs, reducing the availability of farm labour even further.

The spread of education and increasing contact with the outside world has made rural labour aware of their rights and privileges. Unionism (formal or informal) grew among the rural workers, which enabled them to bargain for higher wages. Many farmers feel that the ruling wage rates are high and they shift to less labour-intensive crops.

Price Factors

One of the major factors that influences the choice of crops is the expected income from land. Table 6.1 gives an idea of the trend in farm prices of principal crops in Kerala during the past 25 years.

Rice prices, which showed continuous increase up to mid-seventies declined and ruled low from 1976 to 1982; thereafter they rose slowly and showed strong tendency to recovery by the early nineties. As for coconut, although an upward trend is seen, wide seasonal and periodic fluctuations are common. The movement of tapioca prices showed a pattern similar to rice prices, though in recent years the increase has tended to be steeper. Tapioca being a cereal substitute, especially for the lower income groups, the pattern is in the expected direction.

The prices of pepper steadily increased during the period; however, the increase during 1985-'87 was the sharpest. Pepper prices tended to fall within a couple of years but reverted sharply from 1991-'92. The trend of prices of banana is indicative of the general price trend of vegetables. Although the increase is steady, the rate of increase is not very high. Rubber prices steadily increased during the past 25 years. In fact, it is the only crop for which the price showed a steady increasing trend, until quite recently. Among all the crops, the rate of increase in the prices of rice was the lowest.

When compared to the increase in the prices of agricultural commodities, agricultural wages showed a higher rate of increase during the period. Labour being one of the principal inputs in crop production it is natural that farmers shift to crops requiring a lower labour input. In the case of tree crops like coconut and rubber, labour requirement is high only during the initial stages. Once the crops start yielding, labour is required only for maintenance and harvest. The trend in the comparative prices of agricultural products and wages had the effect of shifting to crops requiring lower labour input.

The fluctuations in the price of agricultural products create a state of insecurity among farmers. In order to spread the risk, they diversify crops preferring those that are expected to give a steady income. From experience, they have found that in the long run coconut is a more reliable and useful crop responding favourably to manuring and irrigation. Income from coconut gardens could be augmented by raising various other crops like banana, tubers, pepper etc as inter-crops. The farmers therefore prefer coconut cultivation with inter-cropping to all other crops. This pattern is said to provide a reasonable level of income from land and at the same time minimise risk due to crop failures and price fluctuations.

Table 6.1 Relatives of Average Farm Price of Principal Crops and Agricultural Wages

Period	Rice	Tapioca	Coconut	Pepper	Banana	Rubber	Wages
1971-72	100	100	100	100	100	100	100
1975-76	188	189	162	214	178	185	158
1980-81	154	203	333	220	221	269	205
1985-86	204	411	350	801	364	395	479
1990-91	254	696	717	594	435	500	658
1994-95	419	1009	733	1236	725	724	1167

Source: Department of Economics & Statistics; Calculated from data in Season & Crop Report 1970 to 1995.

Consequences

Economic Impact

(i) Change in agricultural production

In the paddy-based agricultural system, production from cultivated crops was accounted mainly by paddy, followed by coconut, tubers, banana, and vegetables. Crops other than paddy were not attended to intensively, a practice, which resulted in poor yields from them. Even for coconut, once the seedlings were planted further attention was paid to them only at the time of harvest. Mango, jack, cashew, tamarind etc were just natural growths. Since cultivation was meant mainly for home consumption, monetary income was not the criterion for cropping decisions. The situation has now changed; in the present scenario, cultivation is mainly for income and profit generation. Farmers therefore take special care to select crops and crop varieties with better yields and tend them carefully, to obtain better yields. For instance, the yields of coconut, banana, tapioca, and pepper have more than doubled during the past two decades. Cashew, though an income-generating crop, has almost been replaced by rubber, which generates a more steady and higher income flow. Fruit trees like mango and jack are replaced by income-generating cash crops. The overall result is an increase in agricultural production with major shifts in composition from food items to commercial items.

(ii) Changes in farm income

In the traditional pattern of farming, the dry land that formed about 83 per cent of the cultivable area, yielded very little, since no worthwhile cultivation used to be done there. However, in the emerging pattern the dry lands are put to intensive use with the result that the income per unit area is higher for dry land than for paddy lands. Farmers have made substantial investment in the dry land by way of bunding, terracing, fencing, etc and raising tree crops. Although the initial investment is somewhat high, tree crops provide a steady flow of income for a long period once they start yielding.

Compared to paddy, the risk due to fluctuation in yield is also low for tree crops. In the converted paddy lands, banana and tapioca are cultivated initially and since their yield rates are higher, they bring higher income than paddy farming does. From the point of view of the farmers, the emerging crop pattern with predominance of cash crops has, thus reduced risks and improved standards of living.

(iii) Change in employment and income of rural labour

In the study area, about 38 per cent of rural labour households are of agricultural labourers. During the period when paddy was the main crop, almost all the rural labour was engaged in agriculture, though many of them were under-employed. Nevertheless, in the social system of those days their survival did not pose a serious problem to them. Consequent on the spread of education and implementation of rural development activities, labour became mobile both occupationally and spatially. The shift is associated with the change in crop pattern, but cannot be considered its direct consequence. The demand for agriculture labour is reported to have increased due to increase in area under commercial crops. In addition to the influence of higher wages in the non-agriculture sector, the other factors which helped wage increases for agricultural labour included the decline in the supply of labour to traditional agricultural activities and the proliferation of small holdings.

The present earning levels of agricultural labours are thus much higher than those that existed some three decades ago. In those days, the agricultural labourers moved about in loin clothes; but now they dress decently. Their life styles have also undergone considerable improvement. However, these changes cannot be explained solely in terms of the changes in crop pattern.

The traditional skills of agricultural labourers are being gradually eroded due to non-use because of changes in the farming system. The present generation of agricultural labourers has little knowledge of the traditional varieties of paddy, the traditional methods of cultivation and the soil texture and quality. They just do what they are told to do by their employers. However, some of them are familiar with the modern methods of cultivation, like use of fertilizers and pesticides, and marketing practices.

Agricultural labourers of the older generation were able to attend to all items of farm operations including maintenance of draught animals. However, with the change in the system, labour became more specialised in specific activities. In consequence, segmentation of agri-

cultural labour markets has followed. One of the reasons for the simultaneous existence of unemployment and non-availability of labour in the farm sector lies perhaps in this process of segmentation.

(iv) Women's participation

Side by side with men, women used to play an active role in the traditional agricultural system. In every agricultural labour family all the household members except the very young and the very old, used to do some kind of work to earn a living. Usually all the household members worked together at the same site participating not only in farm operations but ate together and enjoyed leisure time together as well. The wage rates for women were, however, less than those for men. During the months when farm activities were low, women collected and sold firewood and fodder to make both ends meet. Together with men, women were active participants in the struggle for survival. Their roles and responsibilities have changed in the emerging pattern (Figure 6.1).

In the present pattern where paddy cultivation is dwindling, the demand for female labour has diminished considerably. Mainly male workers attend to the agricultural operations in the converted lands and gardens. The change in crop pattern has thus lowered the employment opportunities of women. Some of the female labourers have since shifted to non-agricultural activities like quarrying and construction work. Those who have not shifted, remain at home looking after household chores.

The number of entrants to the rural labour force from the female population has diminished with the emergence of nuclear families, and with the spread of education. The younger generation looks for white-collar work or prefers to remain at home.

(v) Livestock

One of the major impacts of the change in crop pattern is the decrease in the livestock. The decrease in the area under paddy cultivation, conversion of grazing lands for raising tree crops and reduction in area under common resources (pastures near forest and ponds) have made rearing of cattle costly. The reduction of area under paddy and the replacement of animal power by mechanically and human labour has made the rearing of draught animals redundant. In earlier times, rearing of milch cows was common in most farming households and in some of the rural labour households. Owing to increase in maintenance cost, the number of milch animals has come down.

The rearing of goats is common in the rural labour households. While in the earlier days labour households reared them for milk, now they are maintained mostly for their value as a marketable commodity because of the rising demand for goat meat.

Social and Cultural Impact

(i) Cultivator-labour relationship

Earlier, the relationship between the cultivator and the labourer was based not solely on

Figure 6.1 Shifts in Gender Responsibilities of Rural Labour Households in Study Area. Separate Interviews with Men and Women were later Jointly Reconciled After Discussion. Matrices Developed on the Ground Using Stones

Activity/ Area of work	MEN		WOMEN	
	20 years ago	now	20 years ago	now
Earnings from				
i) Agricultural labour	o o o o o o o o o o	o o o o o	o o o o o o o o	o o
ii) Other labour	o o	o o o o o o o o	o o	o o o o
Domestic work	o o	o o o o	o o o o	o o o o o o o o o o
Cattle related	o o o	o	o o o	o o
Education	o o	o o o o o o	o	o o o o o o
Purchase of assets	o o	o o	-	o o o
Marketing/sales	o o o o	o o o o	o o	o o o o
Health related	o	o o	o	o o o o

economic considerations. It was a relationship between two families, of the cultivator and of the labourer. In some cases, the attachment continued for generations. Both the cultivator and the labourer were equally involved in cultivation and depended on each other for survival. The system was in some sense of a feudal type.

With the decline in the importance of paddy cultivation, the attached labour system has lost its relevance. Labourers are now own account workers who shift from employer to employer according to their preference and convenience. This practice has pushed up the self-confidence and self-esteem of the rural labourer.

(ii) Negative attitudes towards agriculture

The older generation of cultivators and labourers were very much attached to land. Among the village community, land was power and denoted a powerful entity in village consciousness. It was a force that could not be denied or destroyed. Therefore, landowners enjoyed a high status in society. The situation has now changed.

The younger generation has no idea of how vital land and cultivation were to their ancestors. Now the hunger for jobs has replaced hunger for land. Agriculture is not being considered a prestigious occupation. People prefer to work in the secondary and the tertiary sectors rather than in the farm sector. Regular paid employment even as a class IV employee in a public office is considered more desirable than independent livelihood on farm earnings.

(iii) Loss of traditional skills

With the shift from low external input system to the modern high external input system, farmers have lost many traditional skills of cultivation. The traditional system was complex and diverse and rural livelihood methods depended on local resources and traditional skills. The farmers adapted techniques using local resources suited to local needs. These methods ensured maximum use of internal inputs that sustained agricultural yields.

In the changed scenario, these skills have vanished. Modernisation transformed cultivation practices making them more dependent on external resources. Seeds, agricultural implements, fertilizers, draught power, etc are purchased from outside agriculture making local traditions and skills irrelevant. Rural artisans who were engaged in making and repairing farm implements and tools have shifted to the construction sector. Younger generations of blacksmiths and carpenters do not have the traditional skills of making farm implements. Local healers of both humans and cattle have no longer a role in the community life. Knowledge of traditional medicines and treatments has also been lost almost entirely.

Environmental Impacts

(i) Loss of local varieties and breeds

In the present system of agriculture, farmers use improved or high-yielding varieties of purchased seeds and seedlings. The introduction of modern varieties and breeds has almost entirely displaced traditional varieties and breeds. Local varieties of mango, which were common in almost all the homestead farms, are a rarity now. As for paddy seeds, more than 15 local varieties were common about 20 years ago. Now only some elderly farmers know the names of these varieties (Box 6.1). Though their yields were not high they were pest and disease-resistant and were best suited to specific localities in the village.

Local breeds of cows are conspicuous by their absence in the study area. Locally-adapted crops and livestock could be critical to deal with particular challenges brought by pests and diseases.

Loss of woods and their biome

Consequent on the increased demand for land for housing purposes, even sacred groves and woods have been destroyed. They were the lungs of the village and were the habitat of a variety of flora and fauna. Further, these places were the storehouse of a variety of medicinal plants and herbs. Near these woods, small water holes and streams were a perennial source of supply of water to the nearby residents. With the elimination of the sacred groves and woods all the have been lost forever.

Receding water table

In most parts of the village, even the deep wells now go dry during the summer season. The water holes and streams that were supposed to be perennial sources of water are also seen to dry up during summer. During discussions, some of the villagers expressed the view that extensive cultivation of rubber in the low lands and the planting of acacia and eucalyptus under the social forestry scheme have affected the water tables adversely as these fast-growing trees draw up large quantities of water from the soil. However, opinions differed among the villagers in this matter.

(iv) Decrease in bio-diversity

During discussions with elderly people in the village, they spoke of the different varieties of herbs, plants and trees that have been lost due to the spread of modern agriculture. In the sacred groves and woods in the extensive dry land zone and the hedges around homesteads, there existed wild growth of a variety of plants and trees. The value of this wild diversity is not recognised by the present generation. They consider these wild resources useless and the land containing them, ill-kempt.

What is not adequately recognised is that not only poor people, but also even farmer households heavily depended on these wild resources. With the loss of wild habitats, these resources are no longer available to rural households. The poorest sections of the population are the worst sufferers, since it was they who had relied on them most as the key source of food, fuel, medicine and fodder.

Table 6.1 Local varieties of seed rice that existed in the traditional agriculture system

Local name of the seed	Duration	Crop season	Yield rate	Special features
<i>Kunippan</i>	SD (3 months)	II crop	7-10m	Champa, dwarf variety suitable for sandy soil. Mainly grown in nurseries in the interim period
<i>Thavalakannan</i>	SD (3 months)	II crop	10-12m	Small-sized rice, red & white varieties
<i>Thulanadan</i>	MD (4 months)	I & II crop	11-12m	Champa, good quality rice, long stem, cloggy
<i>Rajameni</i>	MD (4 months)	I crop	12-14M	White rice, small size
<i>Athikirathi</i>	MD (4 months)	I crop	10-12M	Champa, suitable for all types of soil
<i>Kulavali Manja</i>	LD (6-7 months)	II crop	11-12 M	Champa, medium size
<i>Cherumani</i>	LD (6-7 months)	I crop	11-12 M	Champa; fine rice
<i>Ittikandappan</i>	LD (6-7 months)	II crop	10-12 M	Champa; short thick rice
<i>Kutticheradi</i>	LD (7-8 months)	II crops	12-14M	Champa, plenty of straw
<i>Panamkurava</i>	LD (7-8 months)	II crop	12-14 M	Healthy stem
<i>Cheradi</i>	LD (9 months)	I crop	12-14 M	Good quality champa rice, plenty of straw, suitable for marshy and water-logged areas
Vanku	LD (10 months)	I crop	10-11 M	Long rice, good for popcorn

SD: Short duration ie less than four months

MD: Medium duration ie four to seven months

LD: Long duration ie seven months or more

M: *Meni* - Local unit of yield of rice; one *meni* represents an yield of one *para* of rice in a field of area, 14 cents

The table was prepared based on the discussions the author had with the elderly cultivators in the village.

Granite Crushing Units: A threat to environment

In the wake of the rise in demand for granite materials for construction activities and road-making, stone-crusher units have been mushrooming in the Mookunni hills, during the past five years. The number of stone-crusher units has gone up to eight, of which the majority are operated without licence violating even the basic stipulated norms for controlling environmental pollution. Most of these units are posing a threat to life and property and are emerging as a major ecological threat.

Unaware about the environmental impacts, local people believe that they had only benefited from this labour-intensive industry. However, they agree that large-scale extraction and crushing of granite has depleted ground-water resources and adversely affected crop productivity. Apart from this, crushing operations have created health problems for the nearby inhabitants.

A report prepared by 'Vigil India', a non-governmental organisation, blames the dust pollution from the crushing units, for the high incidence of respiratory diseases and the incessant noise from the crushers for ear and eye problems and even behavioural changes in humans and animals in the area.

While these are criticisms over environmental issues, the other side is that these units provide employment for hundreds of rural labourers directly and indirectly, especially for the displaced farm labourers.

Conclusion

The causes and consequences of the changes in crop pattern are so complex and inter-related that it is difficult to classify and isolate individual factors. The pursuit of increased productivity and economic returns has led to modernization of agriculture and acceleration of the transformation of rural communities. Modernisation of agriculture has produced benefits and improvements in the form of better resource utilisation, larger food availability and higher quality of life. These improvements look so good that one might forget that there have been losers as well as winners in this game.

All sectors of the rural community have been affected by transformation. Decline in the number of persons engaged in farm-related activities, shift of economic opportunity away from women to men, increasing specialisation in livelihoods, migration of rural labour in search of work, withering away of traditional, local institutions - are all features of this transformation. Agriculture has increasingly substituted external inputs and resources for internal ones, reduced the range of skills needed for farming, displaced traditional varieties of seeds and breeds of livestock and reduced bio-diversity. The social and environmental costs of the change have cut deep into the structure of the rural society. The drive for agricultural efficiency, though not the sole cause, is evidently a major factor underlying the transformation.