Chapter V

AGRICULTURAL PRACTICES IN THE TRADITIONAL AND THE GREEN REVOLUTION PHASES IN KUTTANAD

Introduction

Travancore / Kuttanad experienced significant socio-economic changes during the early and the pre-modern phases of traditional agriculture. Kayal reclamation, which got intensified in the pre-modern stage of traditional agriculture, along with other institutional reforms and technological interventions prepared for the change towards the Green Revolution strategy in the region.

The present chapter is divided into three parts: of which the first part attempts to review of the socio-economic conditions that had been prevailing in the region in the traditional phase. The second part makes a brief sketch on the history of the study area. In the third, we attempt to make a discussion on the agricultural practices and relations that prevailed in the traditional and the Green Revolution phases in Kuttanad.

I

The Socio-economic Situation in the Early and the Pre-modern Phases in Travancore

The socio-economic situation that prevailed in the early phase of traditional agriculture in the three political units that comprised the later Keral region, namely Kochi, Malabar and Travancore was very poor. The dwelling huts or places of residence of the labouring class was pitiful [Logan, 1887; Ward and Connor, 1863; Buchanan, 1807]. Even though
houses of Nair chieftains were better than that of the lower class, buildings other than thatched huts were very few.

The diet of the labouring class was poor in the 18th century [Barthalomeo, 1791:158] and all the three political units depended on import of rice [Whiteway, 1899; Foster, 1921, Logan, 1951]. In the land of keram (coconut) even at the beginning of the 20th century the higher castes used punna\(^1\) oil for lighting lamp [Blakrishanan, 1983:157].

The labouring serfs were a half-starved people and in whose diet rice was a very rare, precious item. They used to eat wild tubers, bulbs of water plants and creatures like rat and chameleon to satisfy their appetite [Ward and Connor, 1863]. Rice was not available to common people's consumption.

The Bhramins never toiled in the land. The Nayars and Mappilas laboured very rarely [Buchanan, 1807]. The Bhramins had mastery of a refined language as well as the Sastras-the systematized knowledge. The legend is that Kerala originated as a gift from Parasurama one of the incarnations of Vishnu who also gave the practical lessons in farming\(^2\).

Pulaya a low caste was fully entrusted to rice cultivation in the society [Ward and Connor, 1826; Padmanabha Menon, 1912]. Ninety to hundred per cent of the farming operations in paddy cultivation in Travancore was done by the pulayas [Blakrishanan, 1983:157]. Their position in the society was much lower than that of the buffaloes. They were bought and sold at a price not much higher than that of cattle [Ward and Connor, 1863]. During severe starvation the natives often forced to sell

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1 Punna is an evergreen indigenous tree. Its seed is oily and has a rancid taste. For more details, see Velupillai, 1940:334.
2 Krihigeetha is claimed to be an articulation of that knowledge
their dependents for survival [Forbes, 1834:251]. Due to poor quality and availability of cattle in this area all the farming operations were performed by them [Buchanan, 1807].

There was hardly any monetisation of the transactions. Wages were paid in kind. Majority in the society had no surplus for exchange. People hardly thought of the need for a surplus either. Therefore even barter form of exchange was minimal. The produce of one locality was taken to another very rarely [Velupillai, 1940:2]. They were not concerned about shops or markets. Therefore there was no urge to create a surplus.

The responsibility of the jenmi in farming was supposed to be over with the provision of the specified quantity of seed to the pulayan, a low caste for the season as former was in full possession of the stock. It was the sole concern of the pulayan and his family to bring up the crop.

The pre-modern phase of traditional agriculture marked a transition in the socio-economic setting of the society which prepared the ground for the emergence of capitalist farming and the development and transfer of a corresponding technology.

The rulers of Travancore during the second half of the 19th century set out to remodel Travancore, mainly due to political pressure from the British by establishing a system of fee- paying government English and vernacular schools. The State created and provided the finance for a large Public Works Department, reformed land tenures, commercial laws and the government’s policy regarding caste disabilities [Jeffrey, 1976].

The cardinal aspect of all the reform activities in Travancore lay in the strides made towards the establishment and extension of a cash economy. As a result, during Diwan Madhava Rao’s administration Rs1.5
crores of land value was created when 200,000 acres of land were made alienable, the export trade and the price of labour doubled, a plantation industry was firmly established, monopolies were struck down and communication improved vastly [ibid].

Through a historic decision the Diwan solved the stagnation. In 1865 a proclamation was made granting full ownership rights to the holders of the 200,000 acres of the sircar pattam land [Varghese, 1970; Jeffrey, 1976; Tharamangalam, 1981].

Holders of the sircar pattam suddenly acquired a windfall of saleable, mortgagable land. The relationship between land and cash became much closer. Land became a commodity in the market [Varghese, 1970: 65]. The land reforms made Travancore an area of many thousand small proprietors and secure tenants. Correspondingly land sales became widespread and values increased, and a class of independent cultivator emerged. All these seem to expedited capitalist development in agriculture [Tharamangalam, 1981. The period witnessed a sudden spurt in the reclamation of waste lands in the backwater area of Kuttanad.

Another major development during this period was the activation of the Public Works Department. Thousands of low castes were attracted by the money wages against wages in kind in the farm sector. They became labourers in salaried employment. It introduced them to cash economy just as the landholders experienced due to the land reforms of 1865. It encouraged trade, exchange of ideas and entrepreneurship. Uriyam (forced labour demanded by the state) became function-less and labour was hard to find. Labour scarcity was over come by increasing wages and ensuring their regular payments [Jeffery 1976].

3 The proclamation was issued on June 2nd, 1865 and it has been rightly considered as the Magna Carta of the Travancore peasants [Varghese, 1970:65]
Thus the Public Works Department also caused the beginning of a cash economy to thousands of labourers and land lords. The growth of the cash economy was encouraged by land reforms, extensive public works, increased trade and commerce and large scale planting.

Between 1875 and in 1891 population increased by 10 per cent. It resulted in Travancore which was a rice exporter in the 1840s became an importer of by 1880s. But there was a general improvement in the circumstances of the lower castes, caused by the increased demand for labour and the dramatic increase in, and spread of wages, which enabled them to afford the consumption of more rice. [Ibid]. All these developments in the socio-economic situation in Travancore [Thomas, 1988] affected the internal dynamism of the paddy cultivation in Kuttanad.

II

Kuttanad – History and Physical Features

Kuttanad was the principal rice-growing region in the former princely State of Travancore. It is a deltaic region composed of deep water area and isolated inhabited portions. It is traversed by the rivers Pamba, Manimala, Meenachil, and Achencovil which flow into the Vembanad Lake and finally into the Arabian Sea through the lake4. It is the most important wetland eco-system in Kerala and not co-terminous with any revenue division [Kuttanad Enquiry Commission (K.E.C), 1971].

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4 Vembanad is the largest lake in Kerala. It extends from Alleppey in the south to the Cochin harbour in the north where it is open to the Arabian Sea. Water in the lake is an intermixture of saline water of Arabian Sea entered through Cochin harbour and fresh water from the rivers that flow into the lake. It has a length of 84 k. m and a breadth of 15 k. m with an average of 3.2 k. m breadth, with an area of 202 sq. km [See Kuttanad Enquiry Commission(K.E.C), 1971:13]. Meenachil river enters Kuttanad at Neelimangalam and Nagampdam and the other three rivers, namely Manimala, Pampa and Achenkoil enter Kuttanadu at Thondara, Erapura and Pandalam respectively.
There are varying definitions of the Kuttanad region. In early Tamil literature, like Venpai and Tholkappiyom, Kuttanad is mentioned as 12 Nadu-s (principalities) where the people spoke kodumthami. There are references to Kuttanad in the great Thiruvaymozhi written in the 8th century A.D by the renowned Vaishnavite Saint Nammalvar and in Periyapuram of the 11th century A.D [KEC 1971:3; Aravindakshan and Joseph, 1990:1].

There are different legends and theories on the origin of Kuttanad. It is generally believed that the entire land in Kuttanad was reclaimed from the waters at different periods in history; while “God created earth and the waters, people created Kuttanad by raising it from the waters” (Ramakrishna Pillai, 1974:62; Tharamangalam, 1981:32).

It is held that it was in Kuttanad that the ‘kandava forest’ of reference in the epic Mahabharatha was situated. The legend narrates that the forest was fully destroyed in fire and later covered by silt/mud and later turned into the present wet land. Mud miners unearth logs of burnt wood kari -charcoal from the river beds of Kuttanad [K.E.C, 1971:3; Leo XIII, 1974:59; Kamalasanan, 1993:18].

It is also argued that Kuttanad was once an extensive bay of the Arabian Sea into which many rivers had flowed into. The silt carried by the rivers and deposited at their mouths gradually gave rise to the present seacoast, converting the shallow bay into an extensive backwater track.

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5 A number of villages have kari as suffixes: Ramankari, Puthukari, Mittrakari, Oorukkari, Kandankari, Manpuzhakkari, Chathankari.

6 It is argued that there are evidences to show that originally the sea extended up to the eastern border of the Kuttanad region skirting the mid-land. The tract got elevated with the upheaval of the ‘Varkala laterite formation’, forming an extensive bay into which several rivers discharged the waters. The silt carried by these rivers got deposited at the river mouths giving rise to the present coast and converting the shallow bay into an extensive lake-lagoon backwater system [Aravindakshan and Joseph, 1990:2].
The lagoons and lakes gradually silted up and gave rise to sedimentary formations which were eventually converted into rice fields and garden lands through the gradual process of reclamation.

By and large the whole of Kuttanad is a homogenous area in terms of physical features and cultivation practices. The specific physical features of the area make the farming quite unique and complex. It is one of the handful areas in the world following wetland agriculture below the sea level (below the mean sea level, M.S.L, by 0.6 to 2.2 meters). Its early history is not merely a history of agriculture but the history of a people who paved the foundation of a glorious tradition of conquering marshy places, struggling with unfavourable physical conditions, but friendly to the environment.

Kuttanad has not a well-defined area. Its physical boundaries have been variously defined. As per the Travancore State Manual, Kuttanad comprises twenty two properties, twelve in Ampalapuzha, four in Kottayam, three in Changanacherry and three in Ettumanur (Nagam Aiya, 1906:4).

As per the records maintained in the Punja Special Office, Alappuzha, it extends over 79 revenue villages and spreads over the 7 taluks of Alappuzha and Pathanamthitta districts and 3 taluks of the Kottayam district. They are Chertala, Kuttanad, Karthikappally, Mavelikara, Ambalappuzha, Chengannur, Thiruvalla, Changanacherry, Kottayam and Vaikom.

In another account, Kuttanad denotes the low-lying lands measuring approximately 25 kilometres east-west and 60 kilometres north-south on the west coast of Kerela, spreading over 76 low land villages in the Alleppey

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7 At that time the district of Pathanamthitta was not formed
and Kottayam districts [Jose, 1977:25]. The entire area connected by canals and navigable by canoes and motor boats, is separated from the sea by a narrow strip of land varying in width from about half a kilometre to a little over 11 km [Sahadevan, 1966].

Centuries before, Kuttanadu was treated as a larger area than what it is understood today- as one of the two regions of Kerala. It is stated that there were 1,67,176.48 acres (66870.5 hectares) under paddy in Kuttanad [Velupillai, 1940:311]. From south of Kollam to Nanjinadu, the region was known as Venadu and from north of Kollam up to Ponnani, the area was known as Kuttanad. It is claimed that there are historical proofs to substantiate this statement (Ramakrishna Pilla, 1974:59; Biju Moncompu, 1996:17). But, later it came to represent only a small area.

The total area of this region is estimated to be 631.6 sq. miles out of which 312 sq. miles were wet land, 241 sq. miles garden land and the rest uncultivable dry land like sandy areas, reclaimed kayal and other porampoke land like rivers, canals, roads etc., [K E C, 1971:4].

At present the region comprises the revenue taluks of Kuttanad and Ampalapuzha and parts of Karthikappally, Shertallai, Mavelikara taluks of Alappuzha district; Chengannur and Thiruvalla taluks of Pathanamthitta district and parts of Changanasserry, Kottayam and Vaikom taluks of Kottayam district. Today, the Thannermukkam bund in the north, Thottappally spillway in the south, M C road in the east and the NH 47 in the west serve as the physical boundaries of Kuttanad.

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8 Ward and Conner [1863] too gave a similar account. This tract having already been mentioned, it is only necessary to say that it comprises twenty-two proverlies: twelve in Umballapooly, four in Kollam, three in Shenganachayra, and three in Taithumanur.
The differences between these definitions are more apparent than real. The geographical area indicated in all these appears to be identical and the changes in the number of taluks and *pakuthies* are largely due to changes in administrative boundaries, which have been made from time to time. The image of Kuttanad as low-lying water logged region in North Travancore, which is transformed into vast sheet of water of varying depths during the monsoon season is a clear cut one (Pillai and Panikar, 1965:26).

There is a broad classification of the Kuttanad area into Wet lands (66,000 hectares), Dry lands (31,000 hectares), and Water areas (13,000 hectares) [KSSP, 1992:52]. Of the wet lands, 55,000 hectares are used for paddy cultivation and 11,000 hectares for coconut and other crops. There are 1192 *padashekharam-s* varying from 2 to 1000 hectares⁹ [KSSP, 1992:74].

Based on agronomy Kuttanad is divided into six zones namely, Upper Kuttanad, Lower Kuttanad, Kayal area, Vaikom Kari, North Kuttanad and Purakkad. Upper Kuttanad is closer to uplands and the impact of flood and submergence during monsoon is maximum. Lower Kuttanad is prone to moderate flood impact and prior to the construction of the Thannermukom barrier it was moderately vulnerable to saline water during summer. The southern part of Kuttanad taluk and its major area come under this zone. Kayal Lands refer to the area in the vicinity of the Vembanad

<table>
<thead>
<tr>
<th>Size distribution of Padashekharams</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Area of paddy fields (in hectares)</strong></td>
<td><strong>Number of padashekharams</strong></td>
</tr>
<tr>
<td>2-5</td>
<td>104</td>
</tr>
<tr>
<td>5-10</td>
<td>155</td>
</tr>
<tr>
<td>10-20</td>
<td>248</td>
</tr>
<tr>
<td>20-30</td>
<td>375</td>
</tr>
<tr>
<td>30-50</td>
<td>165</td>
</tr>
<tr>
<td>50-100</td>
<td>107</td>
</tr>
<tr>
<td>100-200</td>
<td>33</td>
</tr>
<tr>
<td>200-500</td>
<td>5</td>
</tr>
<tr>
<td>&gt;500</td>
<td>1192</td>
</tr>
</tbody>
</table>

lake. It is highly vulnerable to the passage of saline water. But the impact of flood is the least in this zone.

North Kuttanad is the deltaic formation of the Meenachil river mostly coming under the Kottayam taluk. This zone is prone to both of flood and passage of saline water. Kari Lands come under the west southern side and the northern side of the deltaic formation. The former is known as Purakkad (mostly in Ambalapuzha taluk) and the latter as Vaikom or Vechoor Kari. They are characterised by high acidity.

Table 5.1: Agronomic Zones in Kuttanad

<table>
<thead>
<tr>
<th>Zone</th>
<th>Area in Ha.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upper Kuttanad</td>
<td>10576</td>
</tr>
<tr>
<td>Lower Kuttanad</td>
<td>16280</td>
</tr>
<tr>
<td>North Kuttanad</td>
<td>6556</td>
</tr>
<tr>
<td>Kayal</td>
<td>9464</td>
</tr>
<tr>
<td>Vaikom Kari</td>
<td>7748</td>
</tr>
<tr>
<td>Purakkad</td>
<td>4313</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>54935</strong></td>
</tr>
</tbody>
</table>

Source: An unpublished note on 'Kuttanad Rice Culture', prepared by the Operational Research Project, (Started as a Joint project of the Kerala University of Agriculture and the Department of Agriculture) Moncombu in 2001, Alappuzha.10

According to the type and lie of the soil, the entire wet land area of Kuttanad has been classified under three broad categories, namely kayal lands, karappadamm and kari lands [K E C, 1971:4]. Kayal land consists

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10 Also in another account by Kerla Shashtra Sahithya Parishath (KSSP), [1992], Kuttanad Facts and Fallacy (Malayalam), p.53, reported the same zones and the total area of paddy field. In some other estimates there is a seventh zone, called Coastal Kuttanad [Aravindakshan and Joseph, 1990]. The deltaic formation and the backwater system separated from the sea by sand dune formation overlaid on silt and clay deposition is identified as Coastal Kuttanad.
of the recently reclaimed beds from the Vembanad Lake. There are 33 blocks in this category and comprise 20,000 acres in the revenue villages of Aiymanam, Kumarakam, and Thiruvarppu of Kottayam District and Kainakary, Kunnumma, Kavalam and Pulincunnoo of Alleppey District. Karappadam lies in the interior of the villages of the eastern and southern parts of the region. It comprises about 1,68,000 acres in smaller blocks called padashekharams. Kari lands are mainly situated in Purakkad in Ambalappuzha taluk, Shertallai (Alleppey district) and Vaikom taluk (Kottayam). It constitutes approximately 12,000 acres of area.

Kuttanad is a unique heritage of humanity with natural beauty and enterprising people. Paddy cultivation in Kuttanad is a test of human effort. Originally, in the traditional phase, it was tuned to the limitations set by the nature. But later, as per the Green Revolution strategy, the environment was adjusted to triumph over the limitations imposed by nature.

**Traditional Farming Practices and Relations in Kuttanad**

In the traditional phase of farming, it appears that the practices were developed and followed by the farmers mindful of the special environmental features of the area. They seemed to be constantly interacting with the nature and evolved a method of farming. Tools and implements were developed accordingly.

The special features Kuttanad makes the method of paddy cultivation unique. Its paddy fields are situated below the mean sea level. Land reclamation had been a regular feature of Kuttanad agriculture. They are submerged with saline water / brackish water during the greater part of the year. Traditionally paddy cultivation in this region is known as punja krishi.
which has been appreciated as "singular struggle of human industry against
the forces of nature" [Nagam Aiya, 1906:6].

In the early days, land was relatively abundant and labour scarce in
paddy cultivation [Kamalasanan, 1993:39]. At a time, only limited land
was brought under the plough. When the cultivation season commenced,
much of this extent was under constant tillage; but as its fertility was found
to diminish after a succession of crops, some portion was then allowed to
remain fallow and water let in. The space thus covered with water for a
considerable time served as a reservoir to the neighbouring fields.

Scarcity of sufficient number of labourers was also another reason
for the above practice. Rice-fallow-rice or rice-fallow-fallow was the
cropping pattern. Periodic land fallowing was taken as a natural method to
regain fertility. In a way, it was an extension of punamkrishi. Fallow land
cultivation resulted in better crops even without any manure.

Till 1916 the punja lands of Kuttanad were cultivated only once in two
years. As a result of the trials conducted on an experimental station started
in 1916 at Kuppapuram near Alappuzha, it was possible to demonstrate the
feasibility of cropping the area every year [Velupillai, 1940:291; Sahadevan,
1966:63-64]. Moreover, by 1940 the above rice-fallow-rice
pattern of cultivation was banned. The immediate reason was the onslaught
of the II World War and the consequent fall in the incoming of rice from
Burma. Farmers were compelled to cultivate more to face the food shortage.

11 Though this is a statement found in the Malabar Manual on the paddy cultivation in Trichur, Nagam
Aiya holds that it is equally true of the cultivation in the Vembanad Lake.
12 The principle of fallowing is not new to the Travancore ryot. Fallow implies a period of rest or
recovery for the land. For various methods of fallowing, see T.K Velupillai, 1940:291-293
13 It is a case of shifting cultivation in the forest lands, where the natural fertility of the soil alone being
taken advantage of for getting good yields. After cultivating for one year, the land is left fallow for 2
years, sometimes 3 years.
14 The experimental station was started by the erstwhile Travancore State Department of Agriculture
[Aravindakshan and Joseph, 1990:4]. As it served its purpose the research station was closed in 1921.
It was in this context that yearly cultivation began in Kuttanad. The practice of allowing kayal lands to lie fallow continued even after annual cropping became popular in other areas of Kuttanad [Aravindakshan and Joseph, 1990:4].

Through fallowing, the cultivators could take the benefit of the silt deposited in them by fresh waters from time to time. Such fields were referred to as Palanilam [Nagam Aiya, 1906, Velupillai, 1940:291:313]. Seeds of longer gestation of about 4-5 months and of taller variety viz. Champavu, Karuthachara, Attikarai etc. were some of the popular varieties of seeds used.

Preparation for the punja crop began after the harvest of the previous crop in February-April. It commenced with the first round of ploughing, one length-wise and the other breadth-wise. It was followed by the application of burnt lime shell for neutralising the acidity of the soil. Then flooding of the paddy field was done either by cutting the outer bund in large breaches of 2-3 metre length, called mada or by opening the sluices called thoompu, which were permanently placed on the outer bund.

Flooding the paddy fields was resorted to for two reasons. The saline water that enters the paddy field washes away the acidity of the soil to a greater extent. Secondly saline water checks the growth of weeds including African payal (salvinia). Moreover, in the monsoon, water coming from the ranges (from the high through the low) causes sedimentation, which increases the fertility of the soil. The extent of fertility varies with the inundation to which it is annually subject, commencing in June and partly subsiding in September or October.
Immediately after the previous harvest, most farmers ploughed the soil two to three times before flooding. A second round ploughing was done in the month of July-August (Karkidakam ploughing) in the submerged soil which was done to uproot weeds like *uzhama*, *chelly* etc. Buffaloes drew the plough almost fully merged in the water and swimming, with the legs just touching the ground.

The farmers used to pass the plough three or four times over the field, 'men and cattle being more than half immersed during the performance of this labour.' The farmers could not think of farming without ploughing. The plough they used ‘however rude, is at least light, simple adapted to the cattle and perhaps to the soil, as the shaves penetrating it more than a few inches is considered injurious’ [Ward and Conner, 1863, reprint-1994:58].

Buffaloes were treated as one of the chief forms of wealth of the farm households. They constituted the chief support of the rural labourers. They were the most suited drought animals to plough the marshy land, lying well below the water. Male buffaloes were solely used for agricultural purposes; in fact they were better workers than bulls especially in wetlands\(^{15}\). She-buffaloes were also used for agricultural purposes, but only until they begin to bear.

The next task was repairing or strengthening the outer bund. This was done in the months of September and October (Chingam, Kanny, Thulam). There were no permanent bunds. Cheap and locally available materials like coconut leaves, twigs of trees, straw, shrubs, reeds and clay

\(^{15}\) The following proverb or rural saying which we came across in the farm interview (shared by a senior farmer having traditional farming experience) is noteworthy: ‘*moori poottiyal pullu vilayum, kaala poottiyal neli vilayum, kannu (pothu) poottiyal ponnu vilayum*. If bull ploughs grass will grow, if ox ploughs, paddy will grow, if buffalo ploughs, gold will grow. The nature of the drought animal determines the yield.
were used for bunding. They were brought down from distant places in country canoes. In areas which were sensitive to breaches, coconut piles were driven deep into the canal as support to the outerbund. The above bunding operation was highly labour intensive and time consuming. The task was done by male labourers usually of Ezhavas and low castes (people belonging to pulaya and paraya communities). This operation in a region was spread over a period of 30-50 days.

In the beginning of each agricultural season the farmer had to ‘regain the land’ through de-watering. After the bund construction, large water wheels (chackram) were used to de-water the fields. Depending on the depth of the water level, chackrams varying from four to thirty two leaves or spokes were in use in Kuttanad. The type of the water wheel used depended on the water level. In very deep places water wheels with thirty two leaves were used. Factors like tide, water level, weather, temperature were taken into account in de-watering strategy.

The de-watering process was to be done uninterruptedly for fear of water rushing back into the field if ever there was a break. Therefore it was a day and night task [Nagam Aiya, 1906:6] and was done on a work shift

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16 There is a detailed poetic narration of the preparation, the materials and the process of making bunds in a collection of folk songs, called Edanadan pattu collected and edited by Sajitha, R [1997], pp: 60-64, Current Books, Kottayam. It was sung by Sri. Chennan Parathara, the oral source, a senior farm labourer, aged 73, of Kodupunna in Kuttanad. He belongs to the paraya community.

17 Before the days of chackram a country-canoe shaped device called thoni was used to de-water fields. The method was too labour-intensive. See Edanadan Pattu: p. 66.

18 Chackrams (wheels) with four to twenty four leaves were used to de-water the kayals and padams. Chackram (wheel) with twenty five spokes requires seven men to work on; wheels of four spokes need only one, but wheels with eight spokes require two persons [Bhashabhoshini, Jan. 2003: 6]. We see another account in Ward and Conner. The chakram is a more complicated machine; it is a wheel varying from four to ten feet in diameter, with spokes about nine inches in their extreme breadth, tapering as they approach the nave. This set in a temporary frame is fixed in the bank of the field to be drained; it is moved agreeably to the size from four to thirty-two people, the severity of the labour requiring a double set; it is put in motion by the pressure of the foot on the extreme ends of the upper arms, those working it being seated on bamboo stages conveniently arranged for this purpose. This machinery is universal throughout Kuttanadu and all the land in its vicinity; it is cumbersome and susceptible of every great improvement [Ward and Conner, 1863, reprint 1994:58,59].
The whole task involved turning the _chackram_ fitted in a wooden carrier called _pathayam_. Over the _pathayam_ and _chackram_, a scaffolding was made, on which one or more persons, depending on the size of the _chackram_ sat and turned the wheels. This labour was known as _chackramchavittu_. For the operation of 32 spokes wheel three persons were required for turning the wheels. One group worked continuously only for 3 hours (one _yamam_\(^{20}\)) and this task was a tiresome and backbreaking one. To avoid drudgery and monotony and thus to lighten and intensify the operations, rhythmic folk songs called _chavittu pattu_ or _chakrappattu_ were chanted [Nagam Aiya, 1906; Pillai and Panikar, 1965:20; Kamalasanan, 1993:40].

After de-watering, inner bunds (_edavarampu_) were repaired and strengthened and small canals (_vaachal_), facilitating free flow of water to the _chakram_- base, were cleared. Land was prepared for sowing. Lime was strewn to check acidity. _Pally_ and _palaka_ (levelling boards) were used for levelling the field. This task was called _pallikkadi_ or _palakakkadi_\(^{21}\).

The grass and aquatic herbs were removed and fields were made ready for sowing. Female labourers were used at this stage to give finishing to the leveling process with hands. This task is known as _thappel_.

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\(^{19}\) A senior farmer Abraham Mathew Nalupara, aged 74, shared that during night, the farmer or the supervisor used to stay in a small country canoe, anchored near the outerbund, to check the labourers from going sleepy. This 'machine' remains in the field throughout the time of cultivation and during the off-season farmers keep _chackram_ properly oiled with fish oil. During times of emergency of flooding due to continuous raining, to save the ripening crop the whole population, including women move to the bund and work on this 'machine'. Nagam Aiya quotes the case of the cultivation in Trichur: "Numberless Persian wheels bristle in their bamboo frame works for the contest with the threatening floods, and as the season advances, thousands of the population, many of them good caste Nayar women are perched high above the scene on these machines continuing the day and night struggle with the rising floods for the preservation of their ripening crops" [Nagam Aiya, 1906:6].

\(^{20}\) One _yamam_ equals 7.5 _nazhika_ and one _nazhika_ equals 25 minutes 24 minutes x 7.5 equals 180 minutes (3 hours).

\(^{21}\) The type of the levelling board varies with the locality. A kind of clod crusher is used in the taluks of Changanassery and Kottayam while a levelling board and beam were used in Kottarakara and other places. In the northern taluks the _ryots_ use another type named _Navari_ for levelling the puddled land [Velupillai, 1940:295].
All the pre-sowing operations are to be completed in a time-bound manner. Sowing involved criticality of time. It has to be over before the month (of Malayalam Era) Makaram for fear that that ‘makarakal’ would ruin the entire sprouted plant. Harvesting had to be completed before Meenam-Medam months.

Before sowing, fresh water was let into the field up to a level of few centimeters. Then sprouted seeds were sown in water through broadcasting. A team of skilled labourers take the sprouted seeds in small baskets and fall in an array across the field. They take a handful of seeds and broadcast first length-wise and then breadth-wise. The latter is called vithamurukku or tightening the sowing to avoid gaps.

Sometimes transplantation was done in karappadam (fields close to the garden land) areas. In this alternative method, seeds were grown in the garden land used as nursery for 20-30 days and the njar (seedlings) were transplanted to paddy fields. This operation, though said to be more expensive because of the labour content, had its advantages. It reduced the need for further transplantation and made weeding out process easy.

After sowing, the sprouted seeds were to be protected from the attack of birds. Farmers keep vigil for 4-5 days and the birds were kept away from the fields through sound clapping or sometimes by the use of crackers.

Manuring was the next operation in the process of cultivation. The first doze of manure was applied within 7-10 days of sowing. In olden days cow dung, wood ash and branches of plants constituted the dominant items
of plant nutrients. Green manuring was followed extensively in wetland cultivation\textsuperscript{22}.

Plants of 10 to 15 days were susceptible to attack of pest, which were managed in eco-friendly ways. For this water was allowed to enter the field up to the ear head of the plant so that the pests climb up to the head of the grown plant. These pests were collected using a particular type of basket sweep (puzhukkotta or pookkotta) and destroyed. Later, the practice of collecting pests with brooms came into existence and the task was performed by women workers [Kamalasanan, 1993:41, 94]. Sometimes the crop was also attacked by insects, especially the one called ‘rice sucker’, locally known as chazhi (rice bug). Neem cake/neem oil and sometimes kerosene were applied to keep them off the field.

Another major activity in the field was the weeding out operation and the ‘gap filling’ by transplantation. A number of female labourers fall in line and work bend forward to the field all the time in the work. The task was really back-breaking and to lighten the strain and to ensure uniformity in the operation this was done in the accompaniment of the chanting of rhythmic folk songs called nadeel pattu for which the lead singers were given an additional ex-gratia payment. Then a second round of manuring was undertaken followed by further removal of weeds.

The last major activity in paddy cultivation was the harvesting operation. It required a large number of both male and female labourers. It involved the cutting of the sheaves, bundling them, taking the bundled

\textsuperscript{22} The use of green manure to wet lands was practised with better perfection in Nanjinad. Special trees were grown for getting green leaves. There were several stages in the application of green leaves. First after ploughing, the leaves were chopped and applied to the soil so that they may mix with the earth and decay. Leaves of certain kinds of trees were preferred to those of others, and especially mango leaves were applied, to make the soil blacker and more tenacious. Portia or Silanti (Thespesia populnea), Erukku (Calotropis gigantea), Mango (Mangifera Indica), Avarum (Cassia auriculata), wild indigo and leaves of jungle trees and others specially cultivated for the purpose were all used largely as manure[Nagam Aiyia, 1906:12].
sheaves (katta) on head to the threshing ground (kalam), threshing, product sharing, winnowing, drying of paddy and hay and finally transporting the grains to the granaries (kalappura) and chambers (pathayam) and piling up of hay (generally in an oblong shape or in a shed\textsuperscript{23}) for feeding the cattle.

Harvesting was performed in various ways. The general practice was that the plants were cut close to the ground. In certain cases where the stalks were not specially useful or when the field was inundated or slushy, only the ears of corn were cut, the stubble were left to rot in the soil. For threshing, a particular place in the outerbund (chira) called methikalam was used where the scaffolding with bamboo (ezha) and other wooden pieces were erected. Male and female labourers holding on to this scaffolding, used their feet for threshing. They dealt with the grains respectfully. Preparations were made weeks before the harvest, like making fresh brooms, bamboo baskets (kotta), big mats (paya) etc. They referred to the brooms not by the usual name (choolu) but by a different name for that occasion (kalamadi) as a mark of reverence to the task.

Wages for harvesting and related activities were paid in kind. It was a system of product sharing. The labourers got a share called patham for the harvesting activities done. Harvesting resembled a festive season everywhere in the region. All were in a haste. Workers from distant places participate in the harvesting operations day and night. The migrant harvesters stay in the improvised huts on the outer bunds of padashekham, called pandhas.

In addition to the Punja crop, a second crop was seldom attempted. But later, in the upper reaches of Kuttanad where the fields were shallow, there existed a deep water crop of paddy cultivation, known as kulappala\textsuperscript{24}

\textsuperscript{23} In traditional times the size of the hay shed, along with other factors, was indicative of the prosperity of the farmer and the potential to provide employment; see Thakazhi, 1948:17

\textsuperscript{24} The cultivation operation in kulappala cultivation began immediately after the harvest of the punja crop in January-February. The fields are ploughed with the residual moisture in the field. The seeds
cultivation. The area under this crop varied every year depending on the seasonal conditions.

Technology (practises) and Traditional Agrarian Relations in Kuttanad

The traditional agricultural relations were structured to suit the agricultural practices in Kuttanad. Traditional agrarian structure in Kuttanad was based on a caste-based hierarchical structure. The following table presents the Caste and Agrarian Hierarchy in the Traditional Travancore Society, wherein the superior ownership rights on land called janmom rights were held by the temple authorities (devaswoms), the Brahmin families (brahmswoms) or the Nair chieftains. The jannies leased out land to tenants in large parcels. These tenants, who mostly belonged to the Nair or Syrian Christian communities in Kuttanad were also owner cultivators in most cases.

Table 5.2: Caste and Agrarian Hierarchy in the Traditional Kerala (Travancore) Society

<table>
<thead>
<tr>
<th>Occupation</th>
<th>Land Rights</th>
<th>Caste</th>
</tr>
</thead>
<tbody>
<tr>
<td>Priests, Rulers, and Administrative Officials</td>
<td>Janmom (ownership) rights</td>
<td>Brahmins, Rajas and Aristocratic Nairs</td>
</tr>
<tr>
<td>Militia in charge of law and order, Petty officials</td>
<td>Kanom (superior lease) rights</td>
<td>Nairs and Nambiars</td>
</tr>
<tr>
<td>Petty producers, Traders, Artisans, Dry land labour</td>
<td>Verumpattom (inferior lease) rights</td>
<td>Non-aristocratic Nairs, Ezhavas, Christians and Muslims</td>
</tr>
<tr>
<td>Wet-land labour</td>
<td>Agricultural labour</td>
<td>Ezhavas, Pulayas, Cherumas</td>
</tr>
</tbody>
</table>

Source: Isaac and Tharakan (1987)

The plants were sown broadcast or dibbled in plough furrows and covered by subsequent ploughing. No manuring was usually done except burning the stubbles and weed growth. Some cultivators applied bone meal. The plants grew with the rising level of water and reached a height of two to three metres in a straggling manner. Both roots and tillers appear from the upper nodes and the plants with the earheads float on the surface of the water. The crop came to maturity in September. The harvesting was done by wading through water and cutting earheads alone, which were bundled and transported in small canoes [Aravindakshan and Joseph, 1990: 5].

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There existed a protected land market in the sense that the privilege of leasing in land was not extended to members of the scheduled castes and tribes who formed the lowest strata of the society. Some owned, others leased and the landless majority toiled in the farm.

The actual tilling operations in the leased out lands were not necessarily done by the tenants but by labourers belonging to low caste (pulayas and parayas) and backward communities like the ezhavas. The scheduled caste members were treated as agrestic slaves and were attached to the land and transacted along with it by the janmies. In peak seasons it would be in the interest of every farmer to ensure an adequate supply of labour to take care of his seasonal requirements. Hence in these areas there developed institutions like the attached labour system whereby each employer ensures the services of an adequate number of labourers by attaching them to his household and offering them monetary benefits.

Even though Kuttanad was a single crop area, the attached labour system was necessary because of its special requirements of cultivation, viz., criticality and intensity of labour application.

Further, farming in Kuttanad was so risky that it warranted persons to keep constant vigil over the paddy fields to prevent the ring bunds against breaking. Because of the rigorous natural constraints, paddy cultivation in Kuttanad has got to be conducted within a strict time schedule, which required an assured supply of labour. Hence it was in the interest of the farmers to have attached labourers. The farmer provided them with land to set up huts (thara) so that they became completely attached to their farms and would be fully available in the service of the landlord.
Besides attached labourers there existed onappanikkars\textsuperscript{25} who belonged to the middle caste-Ezhavas. They were also known as paniyals and they attended to all kinds of farm operations specific to Kuttanad cultivation. They took to their credit the performance of the crop and enjoyed a psychological satisfaction. They were also given a sense of security of employment in the off-season, as sometimes they would be put to work in the garden lands of the farmers or to some other sundry household works. All the time they had to be available at the call and service of their thampuran (landlord) [Kamalasanan, 1993:44].

The prospects of living accommodation and continued employment served to tempt workers to become paniyals. These workers rarely changed their masters. As they continued to stay in the homesteads provided to them. They also became the kudikidappukar (hutment dwellers) of the landlords. The growth of this institution of attached labour was necessitated by the special features of Kuttanad and its cultivation practices.

They were linked to the technology of the time. Or we could say that particular labour-dependent technology prevailed because of the provision for an assured supply of labour (due to the attached labour system). In the olden days, wages for all the operations were in kind, the size and disbursal of which depended more on the mercy of the thampuran (the landlord) than as a right of the labourer.

\textbf{Developments in the Pre-modern Phase}

Certain major developments in the pre-modern phase in traditional agriculture influenced the practices and thereby the relations in the farming sector. Of them, reforms such as the Pattom Proclamation, abolition of

\textsuperscript{25} Thakazhi Shivashankara Pillai [1948] in his novel \textit{Two Measures of Rice} (\textit{Randidangazhi} in Malayalam), tells the story of an onapanikkaran.
slavery; developments like introduction of money wages, demand for marketable surplus; efforts like mechanisation of certain farming operations, formation of trade unions and governmental interventions like research, extension, formation of Industrial Relations Committee (I.R.C), construction of engineering structures like Thottappally Spillway and the Thannermukkam Regulator were the most important. There was a reciprocal influence among these developments, which tended to change the production system towards a new pattern. In this sense the pre-modern phase facilitated the change towards the Green Revolution agriculture.

As already discussed, abolition of slavery in 1854, Pattom Proclamation in 1865 and Kayal reclamation though on a limited scale, gradually led to the monetisation of the economy. Money wages came into practice, but only marginally. The above developments along with the demand for marketable surplus marked the beginning of commercial farming in Kuttanad.

The orientation of the cultivators in farming began to change. They became interested in producing more than what they required for the subsistence of their family and labourers. Prosperity came to be determined by the ability of the cultivator in generating a marketable surplus. They tried to increase production. Locally developed better varieties of seed and marginal application of fertilizer began to be followed. The desire to increase production consequent on better farm price facilitated reclamation of the shallow areas of the Vembanad Kayal.

Kayal Reclamations and Capitalist Farming in Kuttanad

Land reclamation in the specific sense of conquest of land from water has a long history in all the older settlements of the world. But the motivating factors were different. Hygiene considerations, economic
policies, demographic pressures and social objectives have all singly or in
combination influenced the course of land reclamation (Pillai and Panikar,
1965:2)\textsuperscript{26}.

Reclamation was very much associated with the origin of Kerala\textsuperscript{27}. 
Reclamation is so integral to the history and features of Kuttanad that any 
study on Kuttanad has to make a reference to this human toil. It is taken as a 
supreme example of land reclamation from water through the ages, ‘a 
glorified gain of the human strength’ [Varghese, 1974].

Of the reclamation, understood as the Old and the New, the Old 
reclamation was confined to the upper reaches of Kuttanad, which were 
shallow [Pillai and Panikar, 1965; Jose, 1977; Kamalasan, 1993:52]. 
Increasing pressure of population on land, the unprecedented rise in paddy 
price in the post Second World War period and the depletion of shallow 
backwaters for reclamation led to the ‘New Reclamations’. These 
reclamations were in the deep water of the Vembanad Lake.

The reclamation efforts were promoted by the government by 
granting interest-free loans [K.S.S.P, 1992:102], and exempting them from 
tax for some years [Pillai and Panikar, 1965; K.E.C, 1971:5].

The land reclaimed from the Vembanad Lake constitutes the most 
extensive component of the \textit{Kuttanadan punja}. According to Velu Pillai
[1940:312], ‘reclamations appear to have begun so early as 1009 M.E’(i.e., 
1834 AD), if not earlier. Nagam Aiya [1906:5] reports that reclamation has 
been going on in Vembanad on a large scale, especially during second half

\textsuperscript{26} Land reclamation contributes to overall social and economic welfare of the people. Countries like Netherlands, Denmark, Finland and Germany have a long history of land reclamation.

\textsuperscript{27} The popular myth is that the whole of Kerla was reclaimed from the sea by the legendary hero, Parasurama.
Reclamation-cum-farming became the peculiar feature of *kayal* cultivation in Kuttanad. Reclamation was attractive as it turned out to be more economic than the purchase of cultivable rice fields at the existing high prices. Moreover, the new investments paid rich dividends as the entire initial investment on a reclamation project could be fully reimbursed from the net income of one or two crops, if everything went well.

**Mechanisation, Scale and Output**

The first initiative in the mechanisation of the de-watering process, by significantly substituting labour was the introduction of pumping engine with *petty* and *para* in 1912 [Aravindakshan and Joseph, 1990:5]. It occurred in *Kayal* reclamations and it changed the entire face of Kuttanad cultivation. The early period of reclamation was characterised by small scale efforts in forty to sixty acre plots. The mechanical pump revolutionized the scale and nature of the operations and made it possible to reclaim large blocks of hundreds or thousands of acres.

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28 It is generally considered that reclamation in the Vembanad Lake began in 1888 [K.E.C, 1971:5]. There are differing versions on who attempted the first Kayal reclamation. It is generally admitted that Eravi Keshava Panicker of the Chalayil family is the pioneer in this task [Pillai and Panikar, 1965; Tharamangalam, 1981] and he reclaimed the Aattumuttu *Kayal* at the mouth of the Chennamkari River in the Chennamkari village. His second attempt resulted in the reclamation of the Raja Ramapuram *Kayal* in Kavalam Village of Neelamperoor Panchayat, followed by his last attempt of reclamation. He named the lastly reclaimed land as *Mathi Kayal*. In Malayalam *Mathi* means ‘enough’ or ‘satisfied’. Thus he was satisfied with the area reclaimed and withdrew from the task. But a differing view is that it was the father of Madathil Govinda Pillai of Kavalam Panchayat, who first reclaimed the Kayal land [Kamalasanan, 1993:53]. It was the Maharaja who gave the permission namely, *pahivu* to reclaim the *Kayal*. It was the high caste individuals who got the permission to reclaim. *Pahivu* is granted in the name of one individual who makes contract with other shareholders and start the reclamation task. The area reclaimed would be shared among them as per the deed. The low castes were totally kept away from the deed [ibid, 53-54].
The petty and para is a unique locally developed axial flow pump made of wood and iron with local expertise. It was an efficient pump with low suction head with high discharge capacity made by local blacksmiths and carpenters.

Originally steam engines were used, in the process. The steam required was made with charcoal burnt in the boilers [Kamalasanan, 1993:52-53]. Years later came engines run with oil. It was during the time of the First World War that engines with kerosene came to be used [K S. S. P, 1992:19]29. But the bunding process remained as traditional as before30.

Thus the second spell of reclamation was greatly facilitated by the introduction of the mechanical pump and later by the coming of electricity. The extension of paddy cultivation through reclamation was justified by the socio-economic pressure of scarcity of food and its attendant problems31. On the whole about 20,000 acres of the Vembanad Lake had been brought under cultivation by 1945 [Pillai and Panikar, 1965].

As per the following table the total area of kayal reclaimed comes to almost 20,000 acres.

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29 It was a British engineer, George Brenden, who brought some engines from Great Britain, and connected the petty and para, which were made indigenously. See Kerala Shastra Sahithya Parishat [1992] Kuttanad Facts and Fallacy (Malayalam) p.19 and M. Aravindakshan and C.A Joseph [1990], ’Kuttanad Ecosystem’ in, Five Decades of Rice Research p. 5. They quote the date as 1912.
30 K Kamalasanan details the traditional bunding process in the Kayal reclamation (kayal kuthu) [Kamalasanan, 1993:53].
31 Meanwhile, in 1903 there came a prohibition from the Madras Government on ecological ground that the reclamation of Vembanad Lake would be harmful to Cochin Port. But it was lifted in 1912, in respect of the lake area lying to the east and south of a line drawn from Kumarakom point to the Alleppey canal. In this phase the Christian farmers were the pioneers in reclamation. Of them, the most outstanding personality in the later history of reclamation is that of the Kayal king Murikkummoottil Thommen Joseph of Kavalam, popularly known as Murickan, who reclaimed over 2340 acres in six blocks.
### Table 5.3: List of kayal land reclaimed

<table>
<thead>
<tr>
<th>Village</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kainakary Village</td>
<td></td>
</tr>
<tr>
<td>1. Chithira Kayal (Q. Block)</td>
<td>716 Acres 60 Cent.</td>
</tr>
<tr>
<td>2. Marthandham Kayal (S. Block)</td>
<td>674 Acres.</td>
</tr>
<tr>
<td>3. Rani Kayal (T. Block)</td>
<td>568 Acres 59 Cents.</td>
</tr>
<tr>
<td>4. C. Block Kayal</td>
<td>633 Acres.</td>
</tr>
<tr>
<td>5. Aaru Panku Kayal</td>
<td>486 Acres.</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Aymanam Village</td>
<td></td>
</tr>
<tr>
<td>1. Olurran Kayal</td>
<td>52 Acres.</td>
</tr>
<tr>
<td>2. Vattakkayal</td>
<td>213 Acres.</td>
</tr>
<tr>
<td>3. Mali Kayal</td>
<td>103 Acres.</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Kumarakam Village</td>
<td></td>
</tr>
<tr>
<td>1. Ceminary Kayal (Methran Kayal)</td>
<td>413 Acres.</td>
</tr>
<tr>
<td>3. Thumpekkayal</td>
<td>87 Acres.</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Thiruvarppu Village</td>
<td></td>
</tr>
<tr>
<td>1. J. Block</td>
<td>900 1791 Acres.</td>
</tr>
<tr>
<td>2. M.M. Block</td>
<td>596 Acres.</td>
</tr>
<tr>
<td>3. F Block</td>
<td>889 Acres.</td>
</tr>
<tr>
<td>4. Vechukkayal</td>
<td>800 Acres.</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Kunnunuma Village</td>
<td></td>
</tr>
<tr>
<td>1. H. Block</td>
<td>1396 Acres 40 Cents.</td>
</tr>
<tr>
<td>2. Mangalam Manikkyamangalam</td>
<td>1006 Acres 4 Cents.</td>
</tr>
<tr>
<td>3. K.L.Block</td>
<td>827 Acres 30 Cents.</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Kavalam Village</td>
<td></td>
</tr>
<tr>
<td>1. Rajamapuram</td>
<td>1370 Acres 17 Cents.</td>
</tr>
<tr>
<td>2. I.Block Kayal</td>
<td>351 Acres 60 Cents.</td>
</tr>
<tr>
<td>3. E. Block (24000 Kayal)</td>
<td>2366 Acres.</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Pulinkunnel Village</td>
<td></td>
</tr>
<tr>
<td>1. Sreemula Mangalam Kayal</td>
<td>590 Acres 82 Cents.</td>
</tr>
<tr>
<td>2. D. Block Thekke Aarayiram</td>
<td>600 Acres.</td>
</tr>
<tr>
<td>4. D. Block Puthanarayiram</td>
<td>600 Acres.</td>
</tr>
<tr>
<td>6. Thekkemath Kayal</td>
<td>382 Acres 60 Cents.</td>
</tr>
</tbody>
</table>

Source: Kamalasanan [1993, 55-56]
A remarkable feature of *kayal* reclamation in Kuttanad is that, unlike land reclamation elsewhere, it was essentially a private enterprise, 'a classic example of entrepreneurial innovation' (Pillai and Panikar, 1965:21). The initiative came from a few individual entrepreneurs with slender resources. The technology was 'crude indigenous implements and flimsy materials'. The lands were reclaimed from backwaters with depth varying between 8 to 10 ft. of water.

In the *kayal* area the dominant pattern of land holding was peasant proprietorship. In the Old Reclamation areas tenancy was the rule rather than the exception. Much of the lands were owned by the landlords who leased it to a class of tenants. But *kayal* reclamation demanded large resources and entrepreneurship. This peculiar nature of the enterprise attracted the capitalist agriculturists and they had no inducement to leave the land on lease. They followed capitalist farming in the reclaimed land.

The high average size of holding in *kayal* area was very significant for capitalist farming. As per the Sample survey conducted in 1962 (Pillai and Panikar, 1965), it was above 150 acres, while 90 percent of the holdings in Kerala were below 2.5 acres in 1961 [GOK, 1961].

The size of holding justified a high degree of capital intensity, which was a distinctive feature of *kayal* cultivation. Indigenous implements like spades, water wheels, levellers etc., were cheap. But modern mechanical devices like tractors, pumps, sprayers etc., were costly inputs. There was progress in technology in terms of the mechanical inputs used. The capital intensity per holding in the *kayal* area was 74(264 x 74) times the Indian average and 44 (444 x 44) times the average for the Punjab, the State with the highest value of implements per holding [Pillai and Panikar, 1965].
This new awakening in *punja* cultivation demanded better varieties suited to Kuttanad. The establishment of the Plant Breeding Station at Moncompu in 1940 and the introduction of a scheme of research in paddy under the auspices of the then Imperial Council of Agricultural Research (ICAR) came as a response to this demand\(^3\). 

The encouraging feature of the cultivation in the New Reclamation for the farmers was the marketable surplus it generated. An estimate of the surplus created by the 20,000 acres (the total area of the New Reclamation) was 20,77,119 *paras* of paddy, from a net yield of 23,11,250 *paras*. It was 89.86 per cent of the net yield. It was totally incomparable to the subsistence concept of traditional farming in other areas of Kuttanad [Ibid].

All these developments in Kuttanad created among the farmers an intense demand for a technology that would further intensify capitalist farming. The cultivators from this region were observed to possess a high capacity to absorb new technology and an unusual propensity to experiment [Ibid]. They served as good groundwork for the introduction of the Green Revolution strategy in Kuttanad.

The emergence of capitalist farming in Kuttanad initiated changes in the agrarian relations. The formation of peasant movements and trade unions contributed in their own way in the growth towards modern capitalist farming. The high price of paddy during the Second World War made the cultivators to give wages in cash hitherto given in kind. They also tried to turn to improved production techniques.

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\(^3\) For a brief survey of the breeding research efforts of the station see, Joseph et. al [1990] 'Rice Breeding' *Five Decades of Rice Research*, Kerala Agricultural University, Rice Research Station, Moncompu.
Changes in Agrarian Practices and Relations in Kuttanad under Green Revolution

It is argued that paddy cultivation in Kuttanad was fairly advanced even before the advent of the Green Revolution programme. The case of Kayal cultivation, attests the argument. The relatively progressive farmers in the region had already been using such improved strains of paddy as PTB (Pattambi variety) and C.O.25 (Coimbatore variety). During the 1960s, Kuttanad with its natural resource potential, was selected for the Green Revolution strategy [Kurien, 1982] for enhancing food production. The commencement of the Green Revolution era intensified the capitalist farming, which had already begun in the region. Changes in practices occurred mainly in the selection of seed and the application of chemical inputs, both fertilizer and plant protection chemicals.

As already stated, the results of the trials conducted from 1916 onwards under the erstwhile Travancore State Department of Agriculture proved that it was feasible to take a rice crop every year and the practice got wide acceptance among the farmers of Kuttanad. However, the practice of annual cultivation became a regular feature as a result of the pressure exerted by the Government to augment rice production during the Second World War. When the punja cultivation in Kuttanad became the annual feature, the need for better varieties suited for Kuttanad became pressing.

The establishment of the Rice Research Station at Moncompu, the then head quarters of Kuttanad, in 1940 under the auspices of the Imperial Council of Agricultural Research and its work with some improved strains had created a certain amount of readiness and enthusiasm among the farmers to experiment with new varieties of seed. It released the first
varieties, MO.1 (Chettivirippu) and then MO.2 (Kallada Champavu) in 1945. The process of bringing out new varieties got activated with the commencement of the Green Revolution package. Thereafter the station brought out 18 varieties (MO.3 to MO.20). The most important change in practice in the Green Revolution agriculture has been the widespread use of the HY or high-responsive (responsive especially to chemical inputs) varieties.

High Yielding Varieties (HYVs) have been central to the Green Revolution strategy. As elsewhere in the country, the HYVs Programme was brought into Kerala in the mid-sixties. The variety, first introduced was Tinan 3, which did not cover much probably because of its poor cooking quality. Although new varieties of paddy were introduced into Kuttanad in 1966, their real adoption can be said to have begun on a notable scale only with the widespread use of IR8 in 1967-68 (a variety developed in IRRI, Philippines).

In a study by Panikar, [1983] the districts of Kottayam and Alappuzha lead the list, while the northern-most and southern most districts lag behind in the area under HYVs. The new seed varieties had an early start in Kuttanad than in the other 'rice bowl' area, namely Palakkad. Panikar observed that in the course of the first four years since the introduction of HYVs, about 51 per cent of the sample cultivators from Kuttanad, in his study had adopted HYVs, as against 10 per cent in Palakkad [ibid: 32]. Based on the annual data for 1976-77, Kottayam and Alappuzha top the rank with 73.03 per cent and 69.13 per cent respectively.

In another survey conducted in Alappuzha district during 1985, the percentage of farmers who adopted HYVs formed about three fourth

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33 The major portion of Kuttanad lies in these two districts.
The district averages in the three districts are high because the coverage in Kuttanad is cent per cent [Panikar, 1983; Aravindakshan and Joseph, 1990:6]34.

Application of Chemical Inputs

Green Revolution in Kuttanad happened to be a revolution in the biological and chemical aspects of agricultural technology. Therefore the second important practice typical of the Green Revolution technology is the increased application of inorganic fertilizers and plant protection chemicals (PPCs). The new strategy was popularised through a policy of heavy subsidies. This in turn promoted the intensive use of chemical fertilisers and pesticides.

Chemical fertilisers and plant protection chemicals had been used widely and on a relatively large scale. The number of fertilizer depots in the district of Alappuzha increased from 249 in 1961-62 to 403 in 1969-70. It was estimated that the per hectare consumption of fertilizers had increased from 61 kg. in 1961-62 to 190 kg in 1968-69. This represents an annual growth rate of 30 per cent as against 14 per cent in the developing countries. In the district of Alappuzha itself, the off take of nitrogenous fertilizers rose from 4767 tonnes in 1961-62 to 17270 tones in 1969-70. The use of phosphate fertilisers too showed a significant spurt from 6881 to 14208 tones during the same period. The corresponding change in the use of potassium fertilizers has been from 1494 to 5501 tones [Tharamangalam, 1981:30].

34 All the farmers, scientists and agriculture department staff whom we interviewed acclaimed that from almost 1976 onwards, there has been cent percent HYV coverage in Kuttanad. This affirmation comes in the following line-"Now the entire Kuttanad area is under HYVs of rice" Aravindakshan and Joseph, 1990:6].
Continuous application of chemical fertilizers and pesticides resulted in an imbalance in soil nutrients. This has been aggravated by the unscientific application of chemical fertilizers and pesticides by the farmers. They have been under the illusion of 'more fertilizer means more grain yield'. Farmers competed in hastening the fertiliser use. For greater yields, they manipulated the dosage prescriptions of the extension personnel. During the interview a farmer shared the typical behaviour of a farmer in the Green Revolution period that each farmer pretended before his fellow-farmers to be using only a lower quantity but kept the details of the actual quantity and the type of fertiliser used, a top secret. Each one rushed out for a 'wind fall' gain by applying more chemical inputs.

With regard to the selection and application of fertilizers and pesticides they approached the chemical input dealers for guidance. With the target of sales augmentation, the dealers prescribed more than the required quantities, escalating the chemical input bill of the farmers. In a study conducted during 1975-76 [Panikar, 1983], the situation was reported to be more serious. Nitrogen input among the sample holdings ranged from 72 to 118 kg/ha, against the recommended dosage of 60 kg/ha. for high yielding short duration varieties in the upland and 70 and 90 kg/ha. for high yielding short duration and medium duration varieties respectively in the wet lands.

In another investigation on the extent of resource use and economics of rice cultivation in Kuttanad conducted during 1981 [Joseph, Radhkrishnan and Rajendran, 1990], the average use of nitrogen (N), phosphorus(P), and potash (K) per hectare was worked out to 73, 49, 60 kg. respectively, as against the standard recommendation of 70, 35, 35 for short duration varieties and 90, 45,45 per ha for medium duration [KAU, 1981].
However, a study conducted in Alappuzha district in 1985, it was observed that only six per cent of the farmers scrupulously followed the fertiliser recommendation. But only eight per cent applied excess quantity [Joseph et. al., 1990]. This may be because of a new awareness that is being created among farmers.

Studies have been conducted in Kuttanad to assess the gravity of the problem of the indiscriminate application of plant protection chemicals. Kuttanad Water Balance Study [1989:21-22] reported that about 485 -500 tones of pesticides were used for Punja while 117 tones for Virippu. The study presented details on the pesticide concentration in sediment, water and calm from Kuttanad region and the results show that very high levels of DDT were present in the samples collected during summer months (Punja season).

Another study conducted by the Rice Research Station, (RRS) Moncompu, Alappuzha Kuttanad for the period 1980-1990 observed that in Kuttanad for the period 1980-90, 58 to 63 per cent of the farmers used Nitrogen, Phosphorous and Potassium fertilisers more than the recommended dosage. Majority of the farmers use fungicides far exceeding the wanted limit. The gravity of the problem is increased by the fact that 95 per cent of the farmers use lower than recommended volume of spray fluid\(^{35}\) in the use of plant protection chemicals. The overuse of PPCs increased the resistance of pests to chemicals and thereby reduced the resistance of plants to pests [George and Krishnakumariaicamma, 1990].

The general attitude of the farmers in plant protection chemical application has been prophylactic than need-based, which has been

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\(^{35}\) The recommended dose is 500 litres spray solution per hectare. But in order to reduce the labour cost of spraying, commonly, farmers use only 250 litres of spray solution. It increases the concentration of the spray fluid (information shared by the scientists of RRS Moncombu and the extension personnel of the Department of Agriculture).
considered as another reason for the increased quantity of application (based on personal interview with scientists and extension workers).

According to another study [Kannan, 1979:31], pesticide use has gone up to 1000 tones per year. A newspaper report is more tragic which attests the use of about 1200 tones of crystal insecticides and 1,25,000 litres of liquid insecticides in a single cropping season. This ‘extravagance’ in the use of chemical inputs increased the input bill of the farmers [Deepika, 09.03.2003].

Farmers irrespective of size availed of chemical input loan from the dealers with the undertaking to pay the bill at the time of harvest. Even with normal crop the farmers could hardly pay the bill. Most of the farmers run into accumulated debt and bankruptcy.

During the 1970s, with the introduction of the Public Distribution System by the Government of India, per capita availability of food grains increased in the state. As a result, rice prices declined, rice cultivation became increasingly uneconomical; more so in the rice bowl of Kuttanad [Narayanan, 2003].

Another practice that was intended to be spread was the mechanisation of ploughing. Many farmers tried for tractorisation. But the militant trade union of ploughmen especially Kuttanad Uzhavu Thozhilai Union, affiliated to C.P.I(M) objected to its use. The efforts of the enterprising farmers to mechanise the ploughing operation and the strong resistance from the trade unions always disturbed the peace in the Kuttanad fields36.

36 During the field survey, one of the senior farmers, Chinnachen Venganthara shared that he was forced to keep the tractor which he bought, for three years in his shed, due to strong objection from the trade unions.
After a period of prolonged strikes and negotiations, farmers were allowed to do the first ploughing of the dry soil with tractors on condition that after this, the farmers would plough the dry field once, and subsequently the wet fields two times with animals. The union, however, continued to oppose the introduction of tractors. Thus the trade unions exercised their control on the use of a particular technology for cultivation [Deepika, 07.03.1971].

Thus intensification of capitalist farming through the strategy of HYVs brought about momentous changes in the agrarian relations in Kuttanad. It may be noted that technology and affluence have gone against the need for certain types of traditional cooperation [Oommen, 1974]. In the rural life of Kerala, the traditional customs of pooling of labour in thatching houses with coconut leaves, drawing wells etc., which created a sense of belonging to the rural community became things of the past. The reciprocal exchange of labour in farming especially in operations which demanded so many labourers had been fully overthrown by the new culture of Green Revolution. Farmers became fully dependent on external sources of inputs.

The onslaught of capitalist farming persuaded political parties to organise various trade unions. In the Green Revolution stage trade unions got more organised and reached the peak of their militancy. It is observed that by 1974, there were fourteen such registered trade unions which together formed about forty per cent of the total number of agricultural labourers organisations in the whole state [Jose, 1979:13].

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37 The years from 1940 to 1950 witnessed the emergence and growth of agricultural workers' union all over Kuttanad. Initially, it was against the landlords for economic gains and tried to put pressure on the government to enact laws and regulations in their favour. The period from 1950-58 witnessed a continuous turmoil in the labour scene in Kuttanad on issues of higher wages [George, 1984].
The post War developments deteriorated the already crippled existence of the agricultural workers in Kuttanad. Most of them were half-starved. The tendency among the farmers to pay wages in cash instead of the existing practice of kind wages, aggravated the situation. The farmers thought that they could reap higher profits utilising the unprecedented paddy price hike.

Enterprising farmers received tremendous support by way of loans and subsidies. They tried improved practices of farming. The traditional dependence of farmers on labourers reflected in the form of reserve army of labourers and attached labour system began to break up. The benefit of the increased production generated was disproportionately reaped by the big cultivators.

A survey of the newspaper reports during that period sums up the accumulation of tension and the changes in the relation between farmers and labourers. The cordial relation that prevailed among farmers and labourers turned into mutually attacking hatred. Politically organised protests and strikes seriously affected the farm production. Farmers tried to evade the levy on production and the labourers helped the police to nab them. Trade unions demanded higher wages and reduction in work hours and participation in the choice of technology. Harvesting, which had been once a festival occasion of koithupattu and methipattu (harvesting song), became the time of tension and mutual suspicion.

Farmers on the other hand organised themselves and advocated for their right to cultivate [Deepika, 5.3.1971]. Almost all the operations, from ploughing to harvesting became issues of conflict between the farmers and labourers and were characterised by politically triggered protests. Party
flags elevated on the bund heralded the political presence of Communist party in Kuttanad fields. Farmers tried to ignore them. Farming was said to be not only uneconomic, it even endangered human life [Deepika, 22.5.1971].

To sum up, the implementation of the Green Revolution strategy in Kuttanad brought about significant changes in the practices in farming in terms of HYVs and chemical inputs. Mechanisation during the Green Revolution period was only marginal. Green Revolution affected the traditional web of relations that had been existing in Kuttanad. A moderate attempt is made to evaluate the aftermath of Green Revolution on employment, input structure and environment in the ensuing chapter.