The Lure of Prawn Culture and the Waning Culture of Rice-Fish Farming: A case study from north Kerala wetlands

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I. Introduction

A complex and ecologically responsive rice-fish farming system has evolved in the coastal wetland regions of India over centuries[1]. No accurate estimate of the area under this cultivation exists; according to one estimate, it is about 0.7 million hectares[2]. The rice culture in these lands takes place either under deep or floating water conditions. The rice varieties cultivated are traditional types with an average yield of about 1.5 to 2 tonnes per hectare. An important characteristic of this farming system is that to facilitate the cultivation of rice during part of the year, the land has to be dewatered for sowing and subsequently protected from saline water intrusion for crop growth; rest of the year it remains under fresh or saline water depending on the ecological setting. For the organisation of this farming, different types of water control, not only for the cultivation of rice but for the culture of fish as well, are required. There exist variations[3] in this farming system across regions depending on the ecological, technological, institutional, and organisational arrangements conditioning the wetland resource base. While this farming has received some attention from agricultural and fisheries scientists, the socio-economic and institutional factors and processes shaping rice-fish farming have hardly received analytical scrutiny from social scientists. Such an analysis, however, is significant since in recent decades, the wetlands under rice-fish farming has been facing severe threats owing to a variety of factors including the shift from the ecologically sensitive rice-fish farming to the semi-intensive (or intensive) fish farming and aquaculture[4], affecting adversely the environments and livelihoods of the poor.

This paper is a modest attempt to fill this knowledge gap. It is based on a case study of a village in North Kerala. Given the fact that the access and utilisation of wetlands by various stakeholders are governed by common pool, private and state property regimes, it provides an interesting arena to explore institutional and organisational dimensions of natural resource management (NRM). Therefore, within the scope of this micro-study, we have attempted to address the following issues that are less explored in the context of institutional and organisational arrangements in NRM[5]; (i) It is generally argued that inequalities in the distribution of natural resources as a productive asset would result in collective action by stakeholder groups for evolving appropriate institutional and organisational arrangements for the equitable and efficient utilisation of the resource. Though there are a large number of studies adducing evidence in support of this argument, the political and social technology underlying the

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evolution of such arrangements remains relatively unexplored[6]; (ii) studies at the micro level on the institutional arrangements for NRM have hardly taken into account the interaction of external factors like migration, development of markets, and infrastructure, with the local-level factors and processes on the shaping of institutions and resource utilisation[7]; (iii) not much attention has been given in the past in highlighting the possible effects of institutional arrangements on the interests of certain social groups and social relations (including gender relations)[8]. In exploring these issues, we will analyse how ecological and social dynamics influence the NRM activities of diverse groups of people and how these activities in turn, helped to produce and shape a particular kind of environment[9]. In that process, we will also consider the role of diverse institutions in mediating the relationships between social actors and different components of the social ecology.

At the methodological level, the study was carried out taking into account requirements like (i) an appropriate location for field research that could present a complex arena of rice-fish farming, (ii) basic quantitative and qualitative data to illustrate the ecological, technological, socio-economic, institutional, and organisational settings of the study location, and (iii) application of qualitative research methods to trace the processes of change[10] in the rice-fish farming system. Accordingly, we have chosen Ezhome *panchayat* in Payyannur block in Kannur district of north Kerala, adjacent to the mouth of Pazhayangadi-Kuppam River, where over the years, a system of alternate farming of rice and fish has evolved, locally known as *Kaipad* cultivation (See the Map of the study area). An earlier study on the wetland resources of the area[11] has indicated that the resource base has been undergoing degradation in recent years. Another study that looked into the social consequences of resource degradation[12] highlighted that it is the poor and the underprivileged of the society who are the worst affected by this process. However, neither of these studies probed in detail into the socio-economic and institutional dimensions underlying the resource degradation. Thus, Ezhome *panchayat* provides an interesting case to study the wetland rice-fish farming.

Within the overall approach to the study, we have focused our inquiry on the following aspects: (i) description of the agro-ecological system and, its evolution over time; (ii) changes on account of the technological, institutional, organisational, economic, and socio-political forces at work; and (iii) the consequences of these processes on the wetland ecosystem and on the livelihoods of people who depend on it for their survival. The data were collected mainly through focus group discussions with knowledgeable local people, government functionaries, political leaders, farmers, agricultural labourers, bund owners, fish harvesting lessees, and other local people in the *panchayat*, and a statistical survey using a structured questionnaire (The details of the survey method are given in Annexure 1).

The rest of the paper is organised as follows: Section 2 will describe the wetland ecosystem (locally known as *Kaipad*) and the sequence of rice-fish farming operations. Such an understanding is necessary to get a clear insight into the delicate ecological balance that has to be maintained for this cultivation. This is followed in Section 3 by a discussion on the evolution of socio-political and institutional arrangements in *Kaipad* farming. Section 4 presents the analysis of the survey data on *Kaipad* farming, collected from the cultivator households. The extent of dependence of the rural labour on *Kaipad* is analysed in the subsequent section. Section 6 summarises the findings of the study.

2. The Wetland Ecosystem and *Kaipad* Farming

The wetland ecosystem where *Kaipad* farming evolved consists of marshes, swamps, ponds, and paddy fields, which constitutes an important landmass for controlling floods, sedimentation, and pollution. The area is swampy and water-logged, experiencing floods during the monsoons and salinity during summer owing to nearness to the river that merges into the sea. The tidal currents from the nearby sea move through the river and enter the *Kaipad* fields during the high tide and flow out from them during the low tide. The river water is usually saline except during monsoons. Salt water from the sea enters the river during summer when the flow is low. When the water level in the river rises, either due to tides or due to rain, the river water flows into the paddy fields. The tidal waves entering the fields through the river keep the soil moist even during the summer months. As these lands are immersed in river water, they get rich deposits of highly fertile organic matter; therefore, paddy cultivation requires no artificial manuring and fish species receive adequate food.

Ezhome *panchayat* where we conducted our field research has an undulating landscape with hills and valleys interspersed with the low-lying *Kaipad* lands. These lands lie adjacent to Pazhayangadi River and have a spread of about 400 hectares, stretching from Kuppam to Pazhayangadi town, to the north of Pazhayangadi-Kuppam River and south of Pazhayangadi-Thaliparambhu road. The Kuppam River takes an abrupt turn towards the south when it reaches Pazhayangadi creating a number of tiny islands and mud flats in Ezhome.

Ezhome *panchayat* covers an area of 21 sq. km; according to the 1991 census[13] it had a population of 18,555 of which 9433 were females and 9122 males. The average household size was 5.85. As per the 1930 Revenue Settlement Register, the paddy fields of Ezhome *panchayat* extended to 831 hectares. During the British rule, the revenue authorities called this place 'The Akiab' of Chirakal *taluk*, after Akiab in Burma, which had the highest yield of rice in the world. The area under paddy fields in Ezhome has now come down to 361 hectares[14].

The *Kaipad* agriculture is rich in customs, traditions, and local knowledge, which are reflected in the beliefs and practices of the local people, owing largely to their proximity to the natural resource base.

Paddy cultivation

As mentioned earlier, tidal current enters the *Kaipad* fields through the river and this inflow has to be controlled in order to carry out farming operations. As the fields are low-lying and immersed in water they have to be dried before starting agricultural operations. The tidal flows have to be therefore, controlled to prevent water from entering the fields. For this purpose, bunds[15] have been constructed at the narrow ridges of the *Kaipad* fields near the river. The bunds are made up of sticky mud collected from the riverbanks and wild grasses. On an average, the bunds are about 10 feet broad with height a little over the water level at the time of high tides. Locally the bunds are known as *Chira* or *Kandi*. The flow of water is regulated by a sluice wooden gate, locally known as *Mancha*.

Figure 2.1 Map of Ezhome in Kannur, Kerala, India

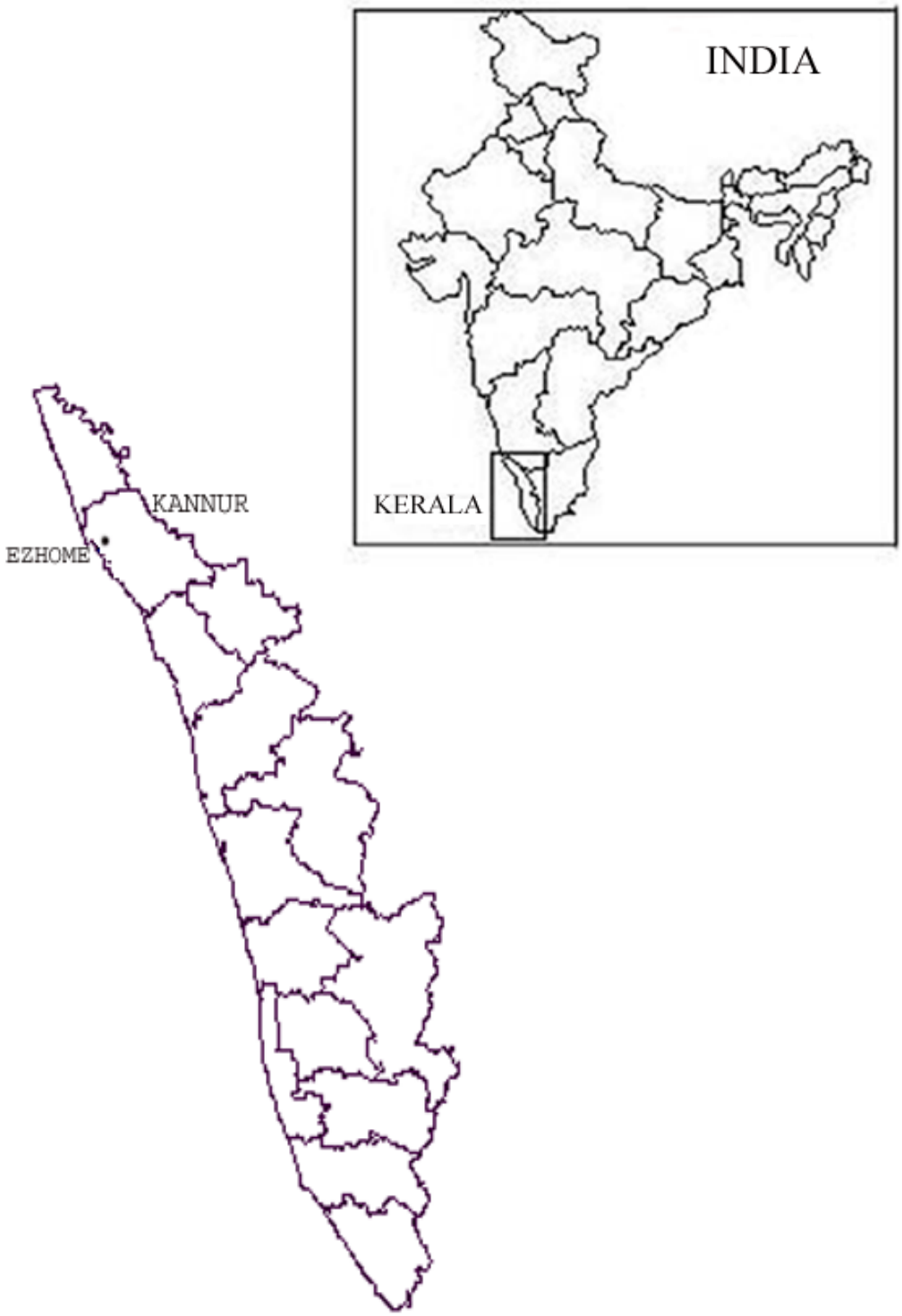
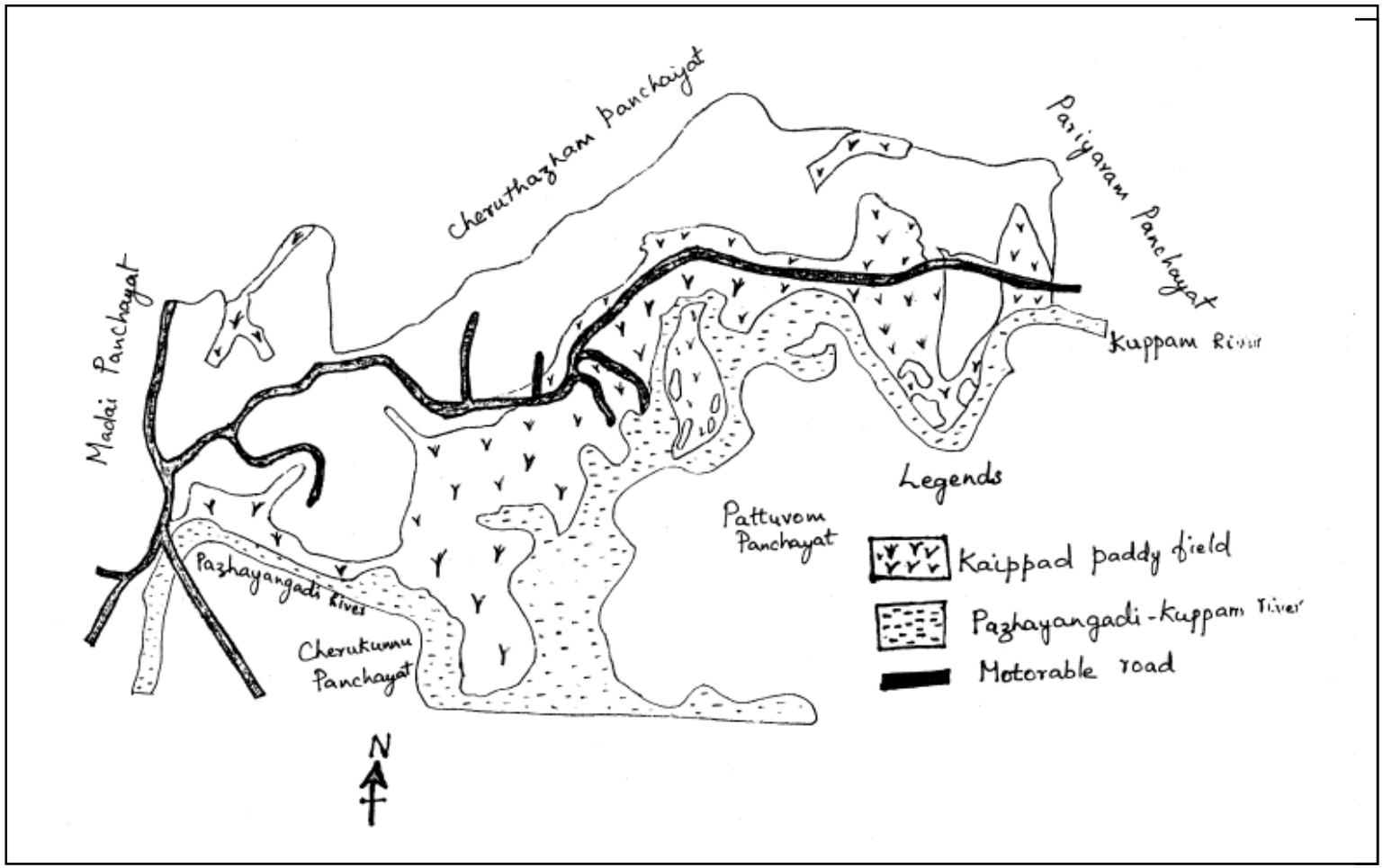


Figure 2.2 Notional Map of Ezhome *Panchayat*



Agricultural operations for cultivating rice begin by mid-April. The saline water is drained out completely and the fields are left to dry for about a month. Once the fields are dried, small mounds (*Potta*) of one-and-a-half feet in diameter and two feet in height are formed. These operations will be over by the middle of May. The farmers then wait for the monsoon rains. By June, the southwest monsoon arrives and as it strengthens, the salinity of the soil in the mounds is washed down by rainwater. As soon as there is adequate fresh water flow in the river, the water outlets of the bunds are opened. From this time onwards, tidal flows are not controlled all through the entire crop season. The fresh river water tides wash down the salinity of the soil. Before sowing, farmers soak the seeds in water for about 24 hours and leave the wet seeds for three days in gunny bags to germinate. The germinated seeds - a variety known as *Kuthir* - are sown on the mounds. After one-and-a-half months of growth, the seedlings become mature enough for transplantation. The seedlings in the mounds are dug out together with the root soil by male workers and are planted uniformly by women workers in the field after removing the weeds. The transplanting work will be over by July end. Weeding is done during mid-August. In this method of cultivation, neither organic nor chemical fertilisers are used nor are pesticides applied. Thus, it is absolutely an eco-friendly farming method and is practised with no change even to this day. Timely harvesting depends on the intensity and rate of rainfall. It is said that some amount of drizzling is required during pollination; if there is too much rainfall or lack of rainfall, there will be crop failure. Further, if the rainfall is low saline water will enter the field during tides and destroy the crop. The crop is usually harvested between the end of September and mid-October.

Prawn filtration

After the paddy harvest, the *Kaipad* fields are used for prawn filtration[16]. With the withdrawal of north-east monsoon in November, the work of strengthening the bunds around the fields begins. The major maintenance work is reinforcement of the sides of the bund with sticky mud from the riverbanks and grass and the fixing of the wooden sluice gate (*Mancha*). Since the sluice is kept open when the water in the canal reaches its highest level, the tidal water enters the fields with the maximum force. Prawns and other fishes move into the fields through the tidal current. The number of young prawns entering the field depends largely on the force and duration of the current. During the tidal inflow, a conical shaped net with an opening at the end is fixed inside the *Mancha*. This net lets in prawns and fish with the tidal flow, but it would not let them out. After the tide, the net is removed and a filter is kept at the mouth of the sluice to prevent prawns and fishes from flowing out from the fields. Water is let in during the two tides. The fields are kept under water for two to three months, allowing the prawns and other small fishes to grow. Rice stubble is believed to be a good fertiliser, giving rise to a dense growth of algae, upon the detritus of which the prawns fatten. Fish filtration begins on *Ekadasi* day, that is the eleventh day from the full moon or new moon day and ends three or four days after full moon or the new moon day. Each harvest is called *Ach;* thus in a month there may be two *Ach* having 14 or 15 days of shrimp filtration during the waxing or the waning phases of the moon. On these days, early in the morning, a net is placed at the outlet of the *Mancha* during ebb flow and prawns are filtered in. This method is locally known as *Kandi Koodal*. The summer filtration continues up to 14 April (*Medam* 1, the *Vishusankranthi* Day), the beginning of the new agricultural year. The species obtained in the fish harvest are mainly *kara chemmeen* (tiger prawn), *vella chemeen* (*naran chemmeen*),

thelli chemmeen (small size shrimps) and fishes like *yetta, paral, irumeen, kauva, chootachi, malan*, and crabs. The agricultural labourers having skill in this particular job do prawn filtration and all other items of work on the bunds. A small hut is constructed on the bund for the workers to stay as most of the work is carried out during night. To avoid poaching, a watchman is stationed there during day and night for the entire season.

The *Kaipad* fields become common access property on *Vishu Sankranti* day. From then onwards anyone can fish from these private paddy fields. Usually the bund owners and or the leased-in fish harvesters undertake intensive fishing before opening the area to the public. To maximise the harvest, two or three days prior to *Vishusankranti* the owner allows anybody with any technique to fish in the fields, on condition that half the catch shall be given to him. This practice is referred to here as *Kandi Kalakkal*, meaning 'churning the field'. After *Kandi Kalakkal*, *Kaipad* fields would remain as a common pool resource for the next two months. During this period, the agricultural workers, mainly the *Pulaya* women who have some traditional methods to trap fish[17], and a traditional fishermen community who during other seasons fish from the river and public canals using nylon nets (*veesu vala, kamba vala,* and *kuti vala*) and hook and line do fishing in these fields. This open access in the *Kaipad* continues only up to the mound-making. There is fish filtration during the monsoon too, known as *Varsha kettu,* and fish is filtered daily at all ebb outs, but these monsoon catches are usually very low. Filtration goes on till the next summer.

3. Evolution of Socio-Political and Institutional Arrangements in *Kaipad*

Complex socio-political and institutional arrangements have evolved in the *Kaipad* system in response to a number of factors, of which some are location-specific and some, external. The study region has witnessed a number of peasant struggles for securing land ownership and fishing rights and struggle by agricultural labourers for increased wages and improved working conditions. In response to the increasing importance of fish culture over rice farming in the *Kaipad* lands, the leasing arrangements have also undergone significant changes. With the disintegration of the joint family system, an interesting property right regime has evolved for sharing the rent on the fishing grounds. Political parties and their ideologies have emerged significant in mediating these institutional arrangements. Based on information gathered mostly from focus group discussions and interviews with key informants, we shall sketch below the changes in institutional arrangements.

About a hundred years ago, three traditional aristocratic families were said to have owned the entire land in the Ezhome *Kaipad* region: the *Chirakal Kovilakom*, a royal family, and two *Namboothiri* families, *Muthedathu Illom* and *Eledethu Illom*. These families did not directly cultivate their lands, but leased them out to a large number of tenants. The rent used to be fixed on the basis of the quantity of paddy used as seed during a crop period. Three people, Palangadan Kelu Nambiar, Muvakan Hassan, and Chappan Mohamed, had leased in a major portion of the *Kaipad* land; they leased out, in turn, some of their leased-in land to smaller cultivators. Thus, at that time, the cultivators in *Kaipad* land consisted of large and small cultivators who directly leased in land from landlords and small cultivators who leased in land from the large tenant cultivators.

The agricultural labourers, especially the Scheduled Caste *Pulaya* community, were bonded to the feudal landlords according to a custom known as *aneem valleem*. At the beginning of the agricultural season, on *Vishusankranti* day, these labourers had to go and collect from their landlords some rice, a tumbler of oil, a piece of coconut, some jackfruits, a *dhoti*, and a piece of jaggery – consumables they were expected to survive on for the next one year and thus, a symbol of their bondedness to the landlords. This custom was very much embedded in the traditional caste system in which the marginalised lower caste Hindu communities like the *Pulayas* who were agricultural labourers were bonded in a servitude to the upper caste and /or upper class *Nambudiris* and *Nair* landlord families. The disintegration of the joint family system as well as the emergent political consciousness and unionisation of the agricultural labourers that led to struggles for their rights put an end to this traditional relationship.

Between 1968 and 1970 Ezhome witnessed a number of struggles between agricultural labourers and the new landowners. In 1968 under the leadership of a prominent political party, the Communist Party of India (Marxist), [CPI (M)], an agricultural labour union – Kerala State *Karshaka Thozhilali* Union (KSKTU) – was formed. It took up as its first priority, the struggles to end the practice of *aneem valleem*. The KSKTU demanded the implementation of minimum wages, fixed by the United Democratic Front Government in 1970. The landlords refused to accept this demand and they ventured to keep the union

workers away from work. This led to a massive agitation with strikes and demonstrations in Ezhome in which the agricultural workers brandished farm implements. These agitations finally forced the landlords to accept the demands of the union.

With the abolition of the tenancy system, the agricultural labour households got the ownership of their hutment (*Kudikidappu)* lands and with it, a sense of security and a heightened sense of belonging to the union. The conflict between landlords and the union workers had intensified. In the name of protecting the bunds and carrying out other works in the bund, the landlords brought in some hooligans from south Malabar, and they began to threaten and assault the local labourers. One night, the workers organised resistance and chased the hooligans away. In the melee, one of the hooligans lost his life. The police charged the CPI (M) leaders with homicide and arrested them. Several of the agitators were accused and sent to jail without bail, but subsequently freed by the courts for lack of sufficient evidence. Struggles like these helped the agricultural labourers to achieve improved working conditions and wages.

With the implementation of the Land Reforms in 1970, all the tenants got ownership rights of the lands. Now ownership of *Kaipad* lands is mainly with some intermediate Hindu *Thiyya* caste families and Muslims, with the exception of a few upper caste *Nambiar* families who were landowners even prior to the reforms. The land ownership/caste-nexus in the village has thus undergone significant changes.

The land reforms gave the *Kaipad* tenants not just the ownership of the lands they were cultivating, but the ownership rights of all the living organisms in the water bodies in this land as well. Accordingly, the shrimps and fish in the land became the property of the owners of the land. However, their realisation of this right did not come about automatically with the legislation; it required organised, protracted struggles with the bund owners who had the water control rights in the *Kaipad* lands. A comprehension of the bund as an institutional arrangement is very vital for an insight into the transformations in *Kaipad* agriculture and the waxing power of the political parties.

During the early part of the twentieth century, bunds were constructed as small water control works for dewatering the fields and controlling the water inflow, facilitating the shift in cultivation technique from broadcasting of seeds to mound-making. It was the big tenants and landlords who invested in these works. However, other cultivators whose lands fell within the command of these bunds also benefited from the technological innovation. Since the control and ownership of these bunds is vested with the big landlords and tenants, it became a source of power for them to influence the small cultivators. As prawns and shrimps had no local market then, the agricultural labourers had easy access to the prawns, shrimps, and crabs that thrived in the rice fields providing supplementary food for them[18]. The shrimps were also dried and sold in the local market. With the development of export market for prawns and commercial fish filtration becoming very lucrative, more actors like the fish harvesters-cum-traders and exporters-cum-moneylenders entered this activity.

The development of prawn/fish culture as an important activity in *Kaipad* lands has resulted in the emergence of new contractual arrangements in the agrarian set-up. Given the fact that

the land falling within the command of a bund is owned by a number of cultivators, it is difficult for the bund owner to negotiate with them for fixing the *chemmeen panam*, the monetary compensation for forgoing the fishing rights. This is further complicated by the inheritance rights over the bunds. With the break-up of the joint family, a bund owned by a family would have many ownership claimants. As the bund can be utilised only as a single entity, it constitutes an indivisible property, but there may be any number of owners with different types of income-sharing pattern. Thus, collective decision-making is followed in administering of the bunds. Another interesting factor is that the bund owner cannot demolish the bund or make any change harmful to the cultivators inside the bund. An individual's ownership right is limited to having his share of income from prawn filtration and sale or transfer of his ownership rights. He is not allowed to make any physical changes to the bund. In certain cases, a bund could be owned jointly by different families belonging to different castes. The Kanooth Kai bund is a case in point. This bund is jointly owned by the members of two families belonging to two different castes – the *Thiyya* and the *Nambiar*. With the exception of this bund, bund owners in Ezhome are all Muslims. Due to the matriarchal system among the Muslims here, some of these bunds have joint ownership; the number ranging from 12 to 120. The sharing pattern in the group ownership is proportional to the shares owned by the families. With the partitioning of the joint family properties, the share for each individual is fixed according to the provisions of the agreement in the partition deeds. The sharing of revenue from bund ownership is further complicated with the owners having different levels of share in accordance with the Muslim matriarchal inheritance rules. The entitlement of *chemmeen panam* by an owner depends upon his share of total shares. With the existence of innumerable owners, it is not surprising that there is also absentee bund ownership. As a natural consequence of these factors, all bund owners cannot be organisationally involved in the fish filtration technique directly. Thus, the practice of leasing out fish filtration rights[19] to contracted harvesters (*Pattakaran*) has come into existence. The summer filtration (*venal kettu*) and monsoon filtration (*varsha kettu*) are leased out separately.[20] The harvester is responsible for the re-strengthening and repairing of the bund and the sluice.

The emergence of the harvester as an actor in these institutional arrangements brings in a process of contractual arrangement between the bund owner or the authorised representative - bund owner in a group ownership situation and harvester. The bund owner is entitled to a rent for the season if fish filtration rights are contracted out to a harvester. This rent is fixed prior to the filtration based on the previous year's catch and an assessment of the market rates for prawns and a part of this agreed amount is paid in advance. For the summer filtration, the harvester is responsible for sharing the income from the fish catch as *chemmeen panam* with the landowner/s inside the bund who had to forego their fishing rights. In the absence of harvesters, it is the bund owners who pay this *chemmeen panam.*

The entitlement of the cultivators inside the bund to *chemmeen panam* was obtained only after prolonged struggles. Due to the increased income generation from prawn culture in *Kaipad* lands, even after implementation of the Land Reforms Act, the bund owners were not prepared to recognise the demand of the cultivators to share the income from the fish harvests with them. The cultivators formed the *Kaipad* Action Committee to fight for this right under the leadership of the CPI (M) together with KSKTU and *Karshaka Sanghom*

Ezhome Village Committee, a cultivators' organisation, also a class organisation of CPI (M). The representatives of this Action Committee negotiated with the bund owners on the sharing of the fish harvest with the cultivators. Most of the bund owners accepted the idea of sharing the fish harvest with the cultivators having land inside the bund. However, one of the prominent bund owners defied this. In response, the *Kaipad* Action Committee decided to construct a separate bund on the fields. On 8 January 1972, the cultivators, agricultural labourers, and CPI (M) workers joined together and constructed a bund parallel to *Akathee Kai* bund, across their fields thus taking over water control and fishing rights. The bund owners then capitulated and consented to a payment of *chemmeen panam* to compensate for their loss of fishing rights and income from it. It was agreed upon that from the summer filtration the cultivators would be given an equal share as the owners, (40 percent each) but that the owners would get the remaining 20 percent for maintaining the bunds. The monsoon filtration revenue being not very substantial compared to the summer filtration, the landowners do not receive any share. If leased out, the bund owner receives separate rent for the monsoon filtration and this amount is fixed through a separate negotiation process between the harvester and the bund owner/ authorised representative in joint ownership.

The amount to be paid by the bund owner/harvester to the landholders as the share of shrimp filtration is fixed towards the end of the summer filtration. The *Karshaka Sanghom* inside each bund area meets separately and discusses the amount to be claimed as *chemeen panam* from the harvester. The amount is estimated on the basis of the yield of shrimps per hectare of land[21] and its price in the market, and previous year's *chemeen panam*. The information on the yield is collected from the workers involved in the fish filtration in the bunds and on the basis of the time taken to sort the catch during the filtration days. Thereafter the *Kaipad* Action Committee (KAC) convenes a meeting of all the *karshaka sanghoms* under it to find out their demands. Once their demands are heard, the KAC meets with the bund owners/ harvesters and informs them about the demand of *karshaka sanghoms* and listens to the views of the bund owners/harvesters. Before the meeting with KAC, the bund owners/ harvesters would meet informally to discuss and decide on the tactics to be adopted and the maximum amount to be agreed upon as *chemmeen panam*. The KAC, having obtained this information, once again discusses the matter with *karshaka sanghoms*. This process could go on for two or three rounds before a final decision is arrived at. Once KAC arrives at a decision after prolonged mediations, it is usually unchallenged. The KAC also collects the *chemmeen panam* and distributes it to the individual owners or harvesters, depending on their share.[22] The unchallenged power of the KAC is largely derived from the power of the political party to which it is affiliated.

It is an indisputable fact that the political parties have been playing an active role in mediating the actions and interactions between the various categories of the agrarian population in the *Kaipad* region. Their influence is evident from the fact that nearly two-thirds of the cultivators are members of political parties, especially the CPI (M). According to our survey, about 75 percent of the cultivators actively participated in political parties. In the case of the agricultural labourers, as noted earlier, the CPI (M) has played a leading role in unionising them and organising struggles for higher wages and better working conditions for them. However, political affiliation to the same party has not been powerful enough to wipe out the tensions arising out of the conflicts of the self-interests of the cultivators and the labourers. When the

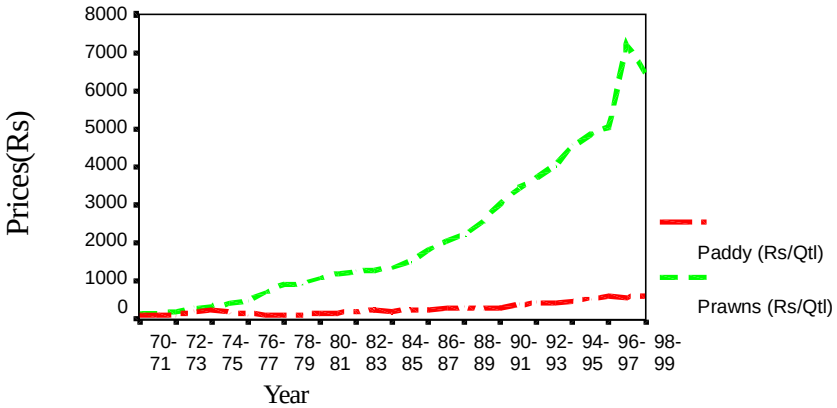
former group views the trade unions as inimical to their interests, and as an organisation whose basic motive is to increase the wages of its members by adopting various tactics including restricting labour supply, labourers view the cultivators as exploiters who try to keep the wages down, rather than as party kinsmen who share the same political ideology with themselves. The labourers view the landowners as an alien group parading under the banner of the party only to engage in collective bargaining with bund owners in order to obtain the maximum rent in terms of *chemmeen panam;* according to them the party is interested only in fixing the *chemmeen panam* as both the party and the politicians stand to benefit monetarily from this bargain.

The importance of the bund as a lucrative entrepreneurial activity may be gauged from the fact that even the *panchayat*, the local self-governing administrative unit, has developed business interests[23]. The Komath bund, the largest bund in Ezhome is owned by the *panchayat*. Prior to land reforms, this bund was owned by one of the prominent families in the region. They gave away the bund to the *panchayat* free of cost owing to the difficulties in maintaining the bund. The *panchayat* began leasing it out for fish filtration every year by giving the 40 percent share of *chemmeen panam* to the landholders inside the bund and utilising 20 percent of the rent for the maintenance of the bund and retaining the 40 percent due to the bund owner.

The bund as an institutional arrangement has also been contributing to the development of other forms of contractual arrangements like the one between the harvester and the prawn exporter. The exporter advances credit to the harvester for meeting the payment of rent to the bund owner and other expenses on the condition that all the fish catch will be sold only to him. When exporters are involved, the negotiation process between the harvester and the bund owner would be influenced by the negotiations between the exporter and the harvester. Price of prawns could thus be a factor in these negotiations and the contractual arrangements agreed upon.

The institutional arrangements discussed above must have undergone changes due to the influence of a variety of factors that have been operating in the local economy and society in particular and the State of Kerala in general. Among these factors the changes in the prices of output from *Kaipad*, viz. rice and prawns is one of the most significant factors that deserves close attention. Under the influence of the growing export market for prawns, its export prices have shown continuous increase over time. At the same time, because of the state policy of ensuring the food security of the population by expanding the coverage and effectiveness, the public distribution system (PDS) has created a dampening effect on the price of rice in the State. This process has been furthered by the expansion of private trade in food grains, facilitated by the increased availability of rice from other regions in the country and removal of restrictions on the inter-State movement of food grains. In recent years, under the pressure of the reform process initiated in the country, the effectiveness of PDS has declined, but the influence of private trade has improved considerably. The overall effect of this process has been the increased availability of rice in the open market and its low prices. Thus, over the last three decades, while the prices of prawns continued to increase, the price of rice has moved at a very slow pace (Figure 3.1), thereby making the culture of prawn more attractive, compared to the cultivation of rice.

Figure 3.1 Average farm harvest price of paddy and beach price of prawns



Source: Paddy prices - Department of Economics & Statistics, Government of Kerala
Prawn Prices - Directorate of Fisheries, Government of Kerala

There are also a number of technological and organisational factors that must have acted together with the product prices to influence the farmers' decision concerning *Kaipad* farming. The technological factor that appears to have influenced *Kaipad* cultivation is the state intervention in water control. In the mid-sixties, the Kattamballi project was constructed to prevent the intrusion of saline water and supply of fresh water into the *Kaipad* lands in the region of which Ezhome is a part, so as to facilitate the reduction of risk in the first crop and the raising of a second crop of paddy[24]. However, the commissioning of the project did not produce the expected results; instead, it has resulted in the intrusion of saline water and reduced supply of fresh water to the fields in the summer months, thereby adversely affecting the ecological conditioning well-suited to *Kaipad* farming. Evaluation[25] of this intervention in water control indicates that it has been contributing to the ecological degradation of *Kaipad* lands.

Coming to the organisational factors, the shortage in the supply of agricultural labourers and increase in their real and money wages noted all over the State have been visible in the *Kaipad* areas also[26]. Owing to the diversification of the economy and expansion of non-farm employment opportunities the supply of labour to the agricultural sector has been on the decline. Rice cultivation, being a labour-intensive activity, has come to be the worst affected in this process.

Cultivators are now more interested in prawn filtration than rice cultivation. A good export market exists for shrimps and prawns and high prices in the domestic market, in accordance with the international demand. *Kaipad* landowners have no role in the fish-filtration process operated in the bunds, other than that of sharing their private access right with the harvester. The *chemmeen panam* is an incentive for most of the farmers. Land that was a means of production has now become a prominent exchange commodity owing to the impact of the Gulf boom and the escalated land price mainly for construction activities. The owners of *Kaipad* lands who are not depending on rice cultivation hold on to the land only because it is a secure asset and a source of secondary income, accruing from fish filtration.With the

increase in population, spread of education, and changes in the socio-economic conditions of the people, activities in non-agricultural sector like trade and transport have expanded. This has led to increased demand for land for residential purposes, shops, roads, etc. Price of land, especially those suited for construction purposes, has been increasing rapidly. Only *Kaipad* wetlands are available here to meet the new demands for land. Gradually, therefore, people started filling up the wetlands for non-agricultural purposes.

Our informants remember about old times when almost all the small and marginal holders employed family labour in their farms. The practice of exchanging the services of family labour among small and marginal cultivators during the peak seasons was also common. This exchange of family labour, to a large extent, reduced their dependency on hired labour during peak periods especially at the time of transplanting and harvesting. With this family labour gone, there is heavy dependence on hired labour even in small and marginal holdings. For the big cultivators who have been depending on hired labour, except for supervision and management, this shift has not been of serious consequence, but the small cultivators have been deeply affected. Hired labour is in great demand now.

At the same time, in the post-land reform period, there has been sharp reduction in the number and proportion of workers in the total work force, as evident from the census data for 1971 and 1991. The cultivators and agricultural labourers have declined both in terms of numbers and as a proportion of labour force. On the other hand, the workers in the construction sector have shown considerable increase (End Note 13). These changes in the supply of labour have aggravated the scarcity of both hired and family labour in agriculture. A good proportion of the younger generation is enrolled in educational institutions. They consider agriculture as an inferior occupation. Consequently, there is much preference to work in the secondary and the tertiary sectors rather than in the farm sector. This is the major reason for non-involvement of family members in farming operations. Besides, most of the parents in the labour households are not interested in their children taking up their occupation; the children too are not interested in working in knee-deep muddy waters. The youngsters are hesitant to take up agriculture even when they do not have any other gainful employment. With chances of supplementary food gone together with the denial of common access to fishing in the *Kaipad* fields, *Kaipad* agriculture is no longer a way of life.

4. *Kaipad* Farming: Findings from the household survey

The observations regarding the decline in *Kaipad* cultivation given in the preceding section are supported by the findings from a sample survey conducted among cultivator households. According to the survey, about 50 percent of the geographical area of Ezhome is under *Kaipad* and the rest is under various other uses (Table 4.1). Strikingly, about 40 percent of the *Kaipad* lands are currently kept fallow. The proportion of *Kaipad* land kept fallow is significantly high in the larger size holdings, i.e. above 250 cents, accounting for 50 percent of the total fallow.

Out of the total number of holdings[27], about 35 percent have been kept fully fallow for the past 10 years and five percent partly fallow. Only the remaining 60 percent of the holdings fully cultivated their *Kaipad* lands. This in turn indicates that there exist severe farm-level constraints in putting *Kaipad* land under productive use. Our respondents identified shortage of both family and hired labour supply as a major factor influencing their decision in keeping the land fallow.

Table 4.1 Land utilisation according to size of holding (*area in cents*)

Land utilisation	**Size class total area**			
	≤ 100	**101-250**	**>250**	**All**
Kaipad cultivation	3893(53.2)	3711(26.5)	1787(18.4)	9391(30.3)
Kaipad fallow (current)	1667(22.8)	1451(10.4)	3197(32.8)	6315(20.3)
Other wet land cultivation	303(4.1)	240417.2	687(7.1)	3394(10.9)
Mangroves	239(3.3)	—	224(2.3)	463(1.5)
Under dry land cultivation	924(12.7)	5959(42.5)	3017(31.0)	9900(31.9)
Area under non-agricultural use	287(3.9)	476(3.4)	814(8.4)	1577(5.1)
Total	7313(100.0)	14001(100.0)	9726(100.0)	31040(100.0)

Note: Figures in parentheses are percentages

Coming to the availability of family labour in farm operations, it may be noted that there has been diversification of occupation among *Kaipad* cultivator households. About 58 percent of the cultivators reported their main occupation (defined in terms of household income) as agriculture whereas the remaining 42 percent reported their main occupation as non-agriculture (Table 4.2). Over 57 percent of the male workers are in the non-agricultural sector while most female workers are confined to the agricultural sector. On the whole, the picture that emerges is that of shortage in the availability of family labour in agriculture among a large segment of the farming households. This fact comes out much more sharply from the

distribution of households employing family labour and hired labour (Table 4.3). It is found that about 40 percent of the households depended entirely on hired labour for cultivation whereas the remaining 60 percent utilised both family and hired labour. Consistent with the diversification into non-agricultural activities by the marginal holdings, their dependence on hired labour also seems to be very high.

Table 4.2 Main occupation of working persons in cultivator households by sex (*No.*)

Occupation	Male	Female	Total
Cultivator	75(38.8)	65(92.8)	140(53.0)
Wage employment in agriculture	9(4.7)	5(7.2)	14(5.4)
Wage employment in non-agriculture	68(35.2)	—	68(25.9)
Self employed in trade/business	20(10.4)	—	20(7.6)
Professional/Technical	16(8.3)	—	16(6.1)
Others	5(2.6)	—	5(1.9)
Total	193(100.0)	70(100.0)	263(100.0)

Note: Figures in parentheses are percentages

Table 4.3 Employment of family labour according to size of *Kaipad* holding (*No.*)

Size of *Kaipad* holding (cents)	Employing family labour & hired labour	Employing hired labour only	Total
≤ 100	50	55	105
101 – 250	30	5	35
Above 250	7	3	10
Total	87(58.0)	63(42.0)	150(100.0)

Note: Figures in parentheses are percentages

The implication of the labour hiring practice described above becomes much more evident from an analysis of the labour use in *Kaipad* rice cultivation (Table 4.4). On an average, cultivation of an acre of *Kaipad* paddy used 34 person days of male labour and 42 person days of female labour, including both family and hired labour. While most of the male labour is utilised in the pre-planting operations, most of the female labour is utilised in transplanting, harvesting, and post-harvest operations.

Cultivation of an acre of *Kaipad* rice incurred a labour cost of Rs 6384 (that includes paid out costs and imputed cost of family labour), with male labour costing about 55 percent of the total labour cost. The cost of labour in various cultivation operations is given in Table 4.5. Estimates of the cost of cultivation per acre of *Kaipad* showed that on an average, Rs 6713 was incurred. It seems to be higher in the smaller size of holdings and tends to decline with increasing size of holdings (Table 4.6). It is significant to note that about 95 percent of the cost incurred is for labour. Coming to the yield per acre of *Kaipad* land, the lowest size group i.e., less than 100 cents, recorded a yield level (594 kg) higher than the average (519 kg) [Table 4.6].

Table 4.4 Per acre labour input in *Kaipad* cultivation

Type of operation	No. of person days	
	Male	Female
Mount making	19.1	5.3
Boundary strengthening	3.8	—
Land preparation	3.8	2.0
Transplanting	6.2	11.0
Weeding	—	1.1
Harvesting & Threshing	0.1	15.2
Transporting	1.3	0.5
Winnowing	—	7.1
All	34.3	42.2

Table 4.5 Average wage expenditure incurred for one acre of *Kaipad* cultivation

Type of operation	Wage expenditure (Rs)		
	Male	Female	Total
Mount making	1913.7	264.9	2178.6
Boundary strengthening	369.5	—	369.5
Land preparation	364.9	103.7	468.6
Transplanting	621.0	553.9	1174.9
Weeding	—	56.2	56.2
Harvesting & Threshing	16.8	1348.7	1365.5
Transporting	1331.2	36.3	167.5
Winnowing	—	603.2	603.2
Total	3417.1	2966.9	6384.0

Table 4.6 Cost and gross income of Rice cultivation in *Kaipad*

Size of *Kaipad* holding (cents)	Area (cents)	Yield per acre (kg)	Value of yield per acre* (Rs)	Cost incurred per acre (Rs)
Less than 100	3893	594	5198	7886
101 – 250	3711	446	3903	5968
Above 250	1787	508	4445	5711
Total	9391	519	4541	6713

Note: *Valued at Rs 8.75 per kilo paddy.
Estimates of cost include the imputed value of family labour. Value of output excludes the value of hay since bulk of it is left in the *Kaipad* land itself.

According to our estimate of the returns from rice cultivation which showed that at the farm

harvest prices that prevailed during the survey year, the value of output from an acre was Rs 4541 as against a cost of Rs 6713, indicating that this cultivation has become unviable. This is true in the case of all size groups of farms. The lack of interest in *Kaipad* cultivation as reflected in the high rates of current fallows is a consequence of such unviability. Since labour cost is the main determinant of the returns from *Kaipad* cultivation, cultivation would appear viable only for those households which could deploy relatively greater inputs of family labour. In fact, the existence of a lease market for *Kaipad* land is highly reflective of this fact. About 10 percent of the *Kaipad* holdings were leased out by owners (who are in non-agricultural occupations) to agriculture labour households who depended primarily on cultivation for livelihood.

While *Kaipad* rice cultivation is becoming an unviable economic activity, the development of fish culture in rice fields has come as a relief to the cultivators. As noted in the preceding section, leasing out paddy fields for fish culture on rent (*chemmeen panam*) has become a widespread practice in the study area. According to the survey, 141 out of the 150 sample holders obtained *chemmeen panam* by leasing out their land (Table 4.7). On an average, a holder received Rs 916 as *chemmeen panam*. The amount varied from Rs 590 in the marginal holdings and Rs 945 in the smallholdings to Rs 4132 in the large holdings. On a per-acre basis, the estimated lease amount among the sample farms amounts to Rs 822.

Table 4.7 Distribution of amount received by cultivators as share of shrimp filtration

Size of holding	**No. of holdings receiving**	**Total no. of holding**		**Average *chemmeen panam* (Rs)**
0-100	97	106		590
101-250	34	34		945
Above 250	10	10		4132
All	141	150		916
Mean amount per acre (Rs)	Total amount (Rs)	Minimum	Maximum	Total *Kaipad* area (cents)
822	129156	45	6200	15706

As owners of *Kaipad* lands have been moving out of rice cultivation and keeping their lands fallow, there has been a spread of mangroves on the fallowed lands. This spread of mangroves, giving rise to the growth of rodents and pests has negative effects on the yield rates of rice in the adjacent fields too. Therefore, fallowed lands lead to the fallowing of adjacent lands. At the same time, mangroves provide ideal spawning ground for many species of shellfish and finfish exploited commercially. Thus, the public interest in the conservation of mangroves, while being friendly towards fisheries is unfriendly to *Kaipad* rice farming. Conflicts in perceptions and decision-making arising from this situation are visible in Ezhome. Once mangroves have grown in fallowed lands, cutting them down for rice farming becomes a costly proposition and such attempts cause opposition from conservationists. All these factors cumulatively provide a congenial space for commercial aquaculture, promoted also by state agencies like Aquaculture Development Agency Kerala (ADAK)[28]. Those who invest in aquaculture are generally non-local entrepreneurs who are willing to pay much more than the

prevailing land prices to grab the *Kaipad* lands. They are people who divert their surpluses from urban business ventures like jewellery stores and bring in their own employees from other businesses to work as labourers and watchmen to guard against local poaching in these commercial fish farms. Though such commercial farms are not too many in Ezhome, in many adjacent villages many such farms have come up displacing local labour, causing great environmental degradation, taking away common fishing rights and altering the institutional arrangements surrounding the bunds and fishing and fish filtering. In the commercial farms permanent cement bunds are constructed and eggs from hatcheries are introduced after chemically cleansing the farm off of all organisms. This chemical cleansing for prawn monoculture destroys many varieties of fish in the river, besides destroying the organisms in the farms. In some regions adjacent to Ezhome, such farms have created conflicts and tensions because of the displacement of local labour and protests from environmentalists against these farms. Such conflicts, however, reinforce the power of the political parties and their negotiation role. However, since the owners of these farms are non-local people the power of the local politicians may be compromised by the interventions from higher level, non-local political functionaries and /or leadership.

All these factors causing decline in *Kaipad* cultivation have implications for the livelihood of labour households who are currently involved in this activity, since any reduction in cultivation may affect their employment and earnings. Given this background, it is important to analyse the socio-economic conditions of labour households, which we take up in the next section.

5. Socio-economic Conditions of *Kaipad* Labour Households

The socio-economic conditions of *Kaipad* labour households in Ezhome will have to be examined against the political mobilisation of workers and the struggles that had taken place for improvement in their employment and working conditions. We have noted earlier that the organised trade union movement among the workers helped them to obtain higher wages and improved conditions of work. Though political parties have very much influenced the labour in Ezhome, it is interesting to note that there are still other types of segregation among the labour households especially in the relationship between labour and use of *Kaipad* cultivation. Caste-based division of labour assumes significance in this context. Traditionally, the *Pulaya* community had more intense association with *Kaipad* resources as they depended on *Kaipad* lands not merely for wage labour. They also fished in these waters for their subsistence with fishing contraptions they themselves could make from raw material freely available in their habitat. They supplemented their diet with other plants and organisms in the *Kaipad* fields. Women and the elderly could thus procure food at their leisure. This population also generated supplementary income from subsidiary occupations like mat-weaving and basket-making from screw pine leaves available in their neighbourhood, in the seasonal leisure allowed by the *Kaipad* agricultural schedule. Thus, traditionally, they had a more intimate relation with *Kaipad* than the *Thiyya* labourers. Naturally, therefore, the decline in *Kaipad* cultivation has left them very vulnerable. It is equally true that the decisions of these Scheduled Caste labourers on whether to supply their labour to *Kaipad* farming or not could contribute to its sustainability or otherwise. In a situation where labour becomes the critical constraint affecting the cultivation of *Kaipad* lands and the fallowing of land could have consequences on the livelihood of labourers who depend on *Kaipad* lands, an inquiry into the inter-related issues of labour costs continuing to be high and the labour supply to *Kaipad* getting increasingly scarce would be revealing.

Agricultural labour households in Ezhome had benefited from land reforms since all of them got the ownership of their hutment dwelling. Our survey has shown that irrespective of caste, all the labour households got some land for dwelling, in some cases up to 50 cents. As pointed out in some of the earlier studies, this has made the labour free from many of the conventional landowner-labour obligations.[29] This combined with the fact that the money and real wages of labour have been increasing would have resulted in some improvement in the material and living conditions of the labour households. However, such an improvement has not occurred. Our survey results show that 64 percent of the households have only *kachha* houses and only 33 percent have *pucca*[30] houses; of these, 60 percent are not electrified, 64 percent have only firewood as cooking fuel, 64 percent have to depend on common well or public tap for drinking water in the absence of their own wells, and 16 percent have no latrine facility. While this picture is not very encouraging, in terms of educational attainments, the situation seems to be better in that about 40 percent of the male and female population have educational attainment of secondary and above-secondary levels. The improved education is also indicative of the possibility of delay in the entry of the younger generation into the work force and a shift of labour force from agriculture to non-agriculture. The activity status of the population in the labour households supports this inference. About 30 percent of the population belong to the category of students. It is also

noted that the activity status of the working population is still dominated by agricultural labour with visible signs of the shift of the labour force to other occupations especially as casual labour (Table 5.1). The fact that the younger generation is uninterested in *Kaipad* cultivation and in acquiring traditional farming skills is evident; 72 percent of the children of *Kaipad* agricultural labourers expressed their disinclination in taking up this activity.

Table 5.1 Percentage of population in labour households according to activity status

Usual Activity	Percentage of population		
	Male	Female	Total
A. Working			
i)Agricultural labour	26.8	35.0	30.2
ii)Fishing/fish vending	7.1	5.0	6.0
iii)Casual labour	17.9	1.6	9.5
iv)Others	1.8	5.0	3.4
Sub total (A)	53.6	46.6	49.1
B. Employment seekers	3.6	1.8	1.7
C. Out side the labour force			
i)Student	33.9	25.0	29.3
ii)Household affairs	--	16.6	8.6
iii)Too young & old	8.9	10.0	11.3
Sub total (C)	46.4	53.4	50.9
D. All	**100.0**	**100.0**	**100.0**

Since new entry into the agricultural labour force is getting reduced and the possibility of labour-saving mechanisation is difficult in *Kaipad*, there is inevitable shortage of agricultural labourers in cultivation operations especially during the peak seasons. It also implies that the age distribution of agricultural labourers will be highly in favour of labourers in the higher age groups. Analysis of the data on the age distribution of agricultural labourers shows that 20 percent of the male and 26 percent of the female workers are above 60 years of age. It is also a reflection of the fact that the aged men and women work in the land since they have very little scope for acquisition of new skills and moving out to other occupations. For such people, clinging to *Kaipad* is a matter of survival.

The employment and earnings estimates of *Kaipad* workers revealed that the male workers obtained 41 percent of their employment from *Kaipad* rice cultivation, 26 percent from other wage labour, and the remaining from fishing in *Kaipad* lands. In the case of female workers they obtained 47 percent of employment from *Kaipad* paddy, 37 percent from other wage labour and 16 percent from fishing (Table 5.2). Thus, the dependence of the workers on the *Kaipad* lands for their employment appears to be very significant. Their dependence on this resource comes out much more sharply when we look at their average earnings from various *Kaipad*-related works and other types of wage labour. On an average, the annual earnings of about 47 percent of the male workers are derived from *Kaipad* labour as well as fishing-related work. Female workers derived nearly 49 percent of their earnings

by working as *Kaipad* labour as well as fishing and the rest from other wage employment. Both from the point of view of employment and earnings *Kaipad* resource remain to be important for the agricultural labour force in the study region. The importance of this resource for the livelihood of the labour households is evident from the fact that in the household earnings, *Kaipad*-related work accounts for a significant share of their earnings.

Table 5.2 Average number of days of employment and earnings of per worker during the last rice-fish year

Type of work	Estimated no. of days of employment			Estimated earnings (Rs)		
	Male	Female	Total	Male	Female	Total
Kaipad labour	18.8 (41.1)	19.3 (47.0)	19.0 (43.7)	1599 (46.9)	1074 (49.1)	1350 (47.7)
Other wage Employment	11.9 (26.0)	15.3 (37.2)	13.5 (31.0)	1230 (36.0)	903 (41.3)	1075 (37.9)
Fishing	15.0 (32.9)	6.5 (15.8)	11.0 (25.3)	583 (17.1)	212 (9.6)	407 (14.4)
Total	45.7 (100.0)	41.1 (100.0)	43.5 (100.0)	3412 (100.0)	2189 (100.0)	2833 (100.0)

Figures in parentheses are percentages

As we noted earlier, there are only a few new entrants to the *Kaipad* labour force and the existing labour belongs mostly to the higher age groups. Therefore, learning new skills and moving out to other occupations is by and large, a difficult proposition for *Kaipad* labour. This fact is reflected in the lack of change in occupational shift in the labour force (Table 5.3).

Table 5.3 Occupational shift of labour (sector-wise)

Occupation when started work	Present occupation				
	Agriculture labour	Casual labour	Fishing & related activities	Others	All
Agriculture labour	33	2	1	1	37
Casual labour	3	9	1	—	13
Fishing & related activities	—	—	5	—	5
Others	—	—	—	2	2
All	36	11	7	3	57

Our findings clearly show that conversion of *Kaipad* wetlands, loss of common rights in fishing, destruction of screw pines and the fallowing of the *Kaipad* lands adversely affect the livelihood of a segment of the labour households with limited alternative opportunities for employment and income generation. Women and the elderly from the labourer households

belonging to the *Pulaya* community are especially vulnerable due to their lesser mobility to search for new employment opportunities and difficulties in learning new skills, in addition to the loss of their traditional means of subsistence and diet. As *Kaipad* cultivation declines, so does the quality of life of these vulnerable sections of society.

6. Conclusions

Though Ezhome region had witnessed a number of agrarian struggles to protect the rights of cultivators and agricultural labourers resulting in the shaping of a number of institutional and organisational arrangements for the utilisation of wetland resources and equitable sharing of the output, the institutional arrangements lost their efficiency and the resource base itself has been eroding over time. The resultant constraints on the sustainable use of the wetlands could not be resolved as the political mediations could not effect any structural changes in agriculture. Collective action could alleviate the socio-economic inequalities that existed in an earlier period and create a more equitable society. Nevertheless, such efforts could not result in an efficient management of resources as a result of the processes of change unleashed by the interaction between factors external to the locality as well as internal to the system. Cultivators' interest in continuing rice cultivation has declined owing to the high wage cost and scarcity of hired labour and the lack of family labour in cultivation. Diversification of economic activities has allowed labour shift from agriculture to non- agriculture. Though the income from prawn culture has compensated the loss in *Kaipad* farming to a limited extent, a section of the cultivators (especially of the large holdings) is keeping their land fallow, thereby causing the spread of mangroves. This, combined with the spread of commercial aquaculture, has been exerting intense pressure on the *Kaipad* ecosystem. The degradation of the resource base has affected adversely the livelihood of one of the most socially deprived sections of the society.

Institutional arrangements to bring about social control for the conservation of these resources will have to be evolved through the active participation of the local communities, local self-governments, and the state. Already, the civil society has recognised, to an extent, the need for wetland conservation and some local civil organisations are involved in the creation of such resource literacy.[31] The local bodies also express their recognition of this need by bringing out plan schemes for the restoration of paddy cultivation and the promotion of fisheries in wetlands. Such interventions, however, have some obvious shortcomings when assessed from an integrated management perspective. To a large extent, this is due to the lack of knowledge on the positive interventions possible in increasing the productivity of wetlands.

The agricultural research system could address the question of increasing the productivity of rice-fish farming and develop ecologically sustainable technologies and actively disseminate this information. Besides the lack of information, local self-governments lack the power and authority to control the utilisation of wetlands for non-agricultural purposes. Under the existing provisions of the acts and rules governing decentralisation, local bodies have very little control on private land owners in preventing the unsustainable use of the land. Most of such powers are currently vested with the State and the Central governments.[32] Further deployment of these powers to the local self-governments will lead to better local ecological management. At the same time, local control over the local ecological resources alone will not mean insulation from the supra-local forces of commercialisation and globalisation. Penetration of these forces into the local economy creates certain issues not easily resolvable, especially at the local level.

When rice is available at low prices from other regions of the country, what would motivate local cultivators to continue with rice farming? Will the state take up the responsibility to compensate the cultivators for their losses in pursuing rice cultivation in view of their contribution to the conservation of the ecologically precious wetlands? Yielding to the lure of prawn culture is in response to an increasing demand from the developed economies that makes this a lucrative venture. Nevertheless, the increasing competition in the world market renders this venture highly vulnerable to the forces of international trade. Whether the local communities would be able to withstand the pressures and insecurities brought in by such global forces is anybody's guess. Whether the increased inflow of export earnings could make up for the ecological degradation that accompanies prawn monoculture is yet another issue on which consensus cannot easily be mobilised. It follows therefore, that effective collective action at the local level to counter the degradation of the resource base is also far from easy and far more difficult to sustain unless informed and legally empowered local governance would committedly join hands with the local leadership and capabilities to generate public debate on the issue and move closer towards a consensus.

Annexure - 1 Sampling Method

Statistical survey: A statistical survey using probability-sampling method was carried out to understand the existing socio-economic situation in the area. The sample survey aimed at collecting data to provide information on the distribution of land holdings, area under dry land and wetland, cultivation practices, income and expenditure pattern of households, and employment pattern of rural population.

Primary data were collected through the sample survey from households of *Kaipad* cultivators and rural labourers. The area selected consisted of two wards namely, Chengala and Kottakil of Ezhome *panchayat* where there is dominance of *Kaipad* cultivation.

The households in the study area were categorised into three groups on the basis of main source of household income and grouped into the following categories:

(i) *Kaipad* cultivators: Households owning *Kaipad* land and receiving more than 50 percent of income from occupations other than agricultural labour and fishing are treated as *Kaipad* cultivators. Among these groups, there may be households not directly engaged in cultivation.

(ii) *Kaipad* labour households: Households in which more than 50 percent of income is from manual labour and any of the members is engaged in *Kaipad* agriculture, fishing or any other activity related to *Kaipad* resource base.

(iii.) Other households: Households having occupations other than the above.

House listing

In order to identify the different categories of households and to build a frame for sample selection a quick enumeration was carried out in two wards (Chengala, Kottakil) of the Ezhome *panchayat* where there is concentration of *Kaipad* cultivation. As per the house list prepared, there were 663 households in the two wards. This is composed of *Kaipad* cultivator households (12 percent), *Kaipad* agriculture labour households (19 percent), and other households (69 percent). The target population for the survey consisted of *Kaipad* cultivators and *Kaipad* agriculture labourers. The number of households in this group was found to be 277, with 113 in Chengala, and 164 in Kottakil. The detailed categorisations in the two wards are given in Table 1.

Table 1 Target population

Category	Chengala	Kottakil	All
Kaipad cultivators households	37	113	150
Kaipad agriculture labour households	76	51	127
Total	113	164	277

Sampling design

From the house listing it was found that there was wide variation in the size of *Kaipad* land

holdings. A stratified sampling method was therefore used for the survey. The households were first grouped as households of *Kaipad* cultivators and *Kaipad* agricultural labourers. The *Kaipad* cultivator households were further stratified on the basis of the size of holding, and a 20 percent sample was selected from each stratum. However, in the stratum of the largest holding size, all households were included in the survey. From the *Kaipad* agricultural labour households, a 20 percent sample was selected. (i.e., 25 households from *Kaipad* agricultural labour household). The selection of households in all the strata was done by the method of systematic sampling. Separate interview schedules were used for canvassing the detailed information from *Kaipad* cultivators and rural agriculture labour/fisher households. Sample size selected for *Kaipad* cultivator are given in Table 2.

Table 2 Sample size for *Kaipad* cultivator households

Size (cents)	Chengala		Kottakil		Total		No. of house-holds selected for survey
	No. of house holds	Total area	No. of house holds	Total area	No. of house holds	Total Area	
< 25	9	133	14	285	23	418	5
26 – 50	7	258	37	1598	44	1856	9
51 – 100	12	1050	41	3529	53	4579	11
101 – 250	7	1265	17	2884	24	4149	5
> 250	2	785	4	1950	6	2735	6
Total	37	3491	113	10246	150	13737	31

Method of estimation for Kaipad cultivator households

$$\bar{X} = \frac{1}{N} \sum_{i} \sum_{j} \frac{Ni}{ni} X\, ij$$

Where N_i – population in the i^{th} stratum

n_i – number of units selected in the i^{th} stratum

N – total population $\sum_i N_i$

n – total sample size $\sum_i n_i$

X_{ij} – observed value of the characteristics of the j^{th} unit in the i^{th} stratum

$\bar{X}$ - estimate of the characteristic for the population

End Notes

[1] The raising of fish in paddy fields either together with rice or after the harvesting of paddy is an age-old phenomenon. The system of fish culture varies depending on the ecological setting of the rice fields. However, it is carried out on a significant scale in the coastal wetlands than on the upland rice fields. For a discussion of the rice-fish farming practised in different parts of the world, see Grist (1965), chapter 13.

[2] This estimate of the area and yield of rice is from Randolph Barker, et al, (1985).

[3] It is interesting to note that such variations are also reflected in the names with which local communities identify this cultivation. For instance, in the central part of Kerala, it is called *Pokkali*, whereas in north Kerala it is called *Kaipad*.

[4] There exists a vast amount of literature that examines the socio-economic impact of semi-intensive and intensive aquaculture in the Asian countries. For a review of literature, see Barraclough and Finger-Stich (1996). In a recent study conducted in Bangladesh, Sani Ito (2002) showed that the shift from rice cultivation to prawn culture indicates that the process while contributing to increased income to the land owners appears to have contributed negatively to the income position of landless men and women from poor households.

[5] In this study, following North (1990), we have viewed institutions as "rules of the game in society" and organisations as the "players or groups of individuals bound together by some common purpose to achieve objectives".

[6] There has been a flurry of literature examining the impact of inequality on collective action. For a review of these studies and their implications for NRM, see Baland and Platteau (1999).

[7] The need to look at local-level NRM issues in the backdrop of such macro-level factors has been sharply pointed out by Agrawal (2001).

[8] This weakness in the existing studies has been highlighted by Agarwal (1998) and Leach, Mearns, and Scoones (1999).

[9] In carrying out this mode of analyses, we are very much influenced by the work of Leach, Mearns, and Scoones cited above.

[10] Analysis of the process of change is essential since the conclusions drawn on a single time period limit their validity as cause-effect relationships may undergo significant changes over time. For a methodological critique of the studies on common pool resources, see Agrawal (2001).

[11] The study on the wetland resources of northern Kerala by Nalini Nayak, et al, (2000)

has examined the mode of resource use in the wetlands. However, an important limitation of this study is that it did not examine the changes in the institutional arrangements and the mode of resource sharing in the wetlands.

[12] See Menon (2000).

[13] Analysis of the census data for Ezhome *Panchayat* for the years 1971 and 1991 reveals not only significant increase in population, but changes in the occupational pattern of the population as well. Some of the interesting facts are summarised below:

Ezhome village covers an area of 1895 hectares. According to 1971 census, it had a population of 13,739 which moved up to 17,715 in 1991. The Scheduled Caste/ Scheduled Tribe population was 1669 in 1971 and 1709 in 1991. Total literacy rate came up to 79 percent in 1991 from 55 percent in 1971. The sex ratio in the village is more or less constant; 1.05 in 1971 and 1.07 in 1991. In 1971, 34 percent of the population was found to be workers, which came down to 26 percent in 1991. There was 40 percent decrease in the number of cultivators and agricultural labourers, whereas a three-fold increase was noted in the number of construction workers between 1971 and 1991.

[14] See *Panchayat Vikasana Rekha,* Ezhome.

[15] The construction of bunds for the cultivation of rice in this region took place about 100 years back. Prior to that, the cultivation was done under the natural eco-system. The introduction of water control by constructing the bund should be considered an important technological change in cultivation, since it has contributed not only to the reduction in risk and uncertainty in cultivation, but also to the practice of improved cultivation methods. Whether such changes introduced through water control systems could be termed as technological has been a subject of interesting discussion in the context of Asian rice economies. Details can be had from Ca Bray (1986), chapter 4.

[16] The practice of prawn fishing in the paddy fields is widespread in the coastal wetlands of Kerala. The scientific basis of this culture has attracted a lot of attention in the past. Grist (1965) in his classic work on rice has cited the study of Menon, who has documented the prevalence of this practice in the erstwhile Travancore-Cochin area. According to Menon's estimate, the yield of fresh prawns per acre of rice fields was about 700-1900 lb per acre per season. In terms of dry weight, it is estimated to be around 106-295 lb. In the 1950s, when Menon conducted the study, prawn was sold in dried form.

[17] Their traditional method of fish trapping is termed as *thappal* and *therekkal*, meaning searching. They sit in knee-deep water with neck just above the water surface and search for fish with both hands. The fish caught by bare hands are put into a basket locally known as *kuriya*, which they hold between their teeth. They also fish with traditional implements like *pedal* and *kothud*. *Pulaya* women are involved in *thappal* for collecting shrimps. Using *kuthoodu* is another method of fish trapping. This fishing

contraption is made of split reeds, open on both lower and upper parts, stuck into the riverbed; the fishes trapped within are removed by hand through the open upper portion.

[18] These people fished in the *Kaipad* fields, canals and from the sluices of the bunds (*Mancha*) using *Pedal*, a cylindrical fish-trapping equipment made up of mid-ribs coconut leaves. This technique was developed from their mat-making skill. It should be mentioned here that at that time the *Kaipad* fields were a common-access property, after rice harvest.

[19] Decision on leasing out is usually taken by the male owners representing the family among the group owners. They take decisions collectively and inform the locally residing owners to implement them. The local resident owners supervise the working of bunds on behalf of non-resident owners.

[20] In the earlier days, fish filtration in the bund was done once in a month during the summer seasons, from December to May. Nowadays fish is filtered in monsoon also. The filtration technique has also been modernised from the traditional *Pedal* system to the use of nets. The fish filtration technique, now being practised, came into existence about 40 years ago.

[21] It is to be noted that, in fact, the quantity harvested varies according to the nature of catchment area, nearness to the river, and area inside the bund. For instance, during the past three seasons the *chemeen panam* declared for the *Kaipad* farmers ranged from Rs 500 to Rs 800 per acre.

[22] Besides the KAC, the Communist Party of India (CPI) also has the leadership of some *Karshaka Sanghoms*, (Cultivators Association) which control the *chemmeen kettu* process. But CPI does not have much public influence unlike the CPI (M)-led KAC. Therefore CPI has less bargaining power in the fixation of *chemmeen panam*. It always follows the decision taken by the KAC; the only task they perform is the distribution of the amount among the landowners.

[23] Now there are 17 bunds in Ezhome, big and small. Of these 12 are important in respect of their income and the extent of catchment area. They are *Komath, Chootayam, Porathe Kai, Akathe Kai, Kannoth Kai, Potheyal, Kaniyante Kiam, Choolikal, Kannoom, Peringayil, Kotila,* and *Manpoya.*

[24] This is a multi-purpose project which has among its aims, saline water exclusion, flood control, navigation, communication, and reclamation. The engineering structure consists of (i) regulator-cum bridge; (ii) a navigation lock over; (iii) an approach road of about one-and-a-half miles length. The project when completed was expected to save 3678 acres of land from salt water intrusion and floods. The first crop would be fully stabilised over the entire area. In certain areas, a second crop also can be raised by pumping water from the upstream side of the regulator. It is expected that about 1000 acres of land could be reclaimed by canalising the river in later stages. The

project executed at a cost of Rs 5.8 million was commissioned in 1966 (refer to *Kerala District Gazetteers–Cannanore*, 1972).

[25] The commissioning of the project has contributed to changes in the ecology of the wetlands and thereby to cultivation of *Kaipad* rice and fish culture. This invited protests from civil organisations. The Kerala *Sastra Sahitya Parishat* conducted an evaluation of the project and its findings reveal that (i) the project did not realise its objective of promoting rice cultivation; (ii) there has been a reduction in the water level in the river due to low recharge in the watershed areas. Due to this, and because of the faulty shutters which allowed salt water to enter the upstreams of the barrage, the second phase of the project for the construction of canals has not been attempted to; (iii) the anardomous fishes migrate from the sea to the river for spawning. Due to the block to the rover, this movement has been curtailed resulting in the loss of fish production; (iv) the shutters are permanently shut now owing to damages. There are holes in the shutters causing ingression of saline water to the upstream areas. Therefore, the water cannot be used for lift irrigation. Since the water recharge to the basin is much less, the intrusion of saline water is comparatively high. The water quality in the *Kaipad* lands has also been affected because of the construction of weirs in Kunnimangalam *panchayat* (at Perumpuzha and Puthiyapuzhakkara) and in Moolakkal in Madayi *panchayat* that interfered with the natural drainage system.

[26] A number of studies conducted in the past have conclusively shown the increase in money and real wages of agricultural labourers in Kerala. For a recent analysis, see Baby (1996, 2001).

[27] During the pre-land reform period control on land in Ezhome vested with a few landlords. Consequent on land reforms, the former tenants who belonged mostly to the intermediate *Thiyya* caste and the Muslim community became owners of land. Presently about 75 percent of the land-owning households are *Thiyyas* and about 20 percent are Muslims and only the rest of the 5 percent belong to other Hindu castes. Coming to the size distribution of ownership holding it is noted that 70 percent of the holdings are below 100 cents and nearly one-half of the holdings are below 50 cents indicating the existence of a large number of small and tiny holdings. At the upper extreme only about five percent of the holdings are above five acres. Thus, a large degree of inequality exists in the distribution of land.

[28] The area under aquaculture in Kannur district (located mostly in the *Kaipad* lands) is about 350 hectares. This accounts for about 10 percent of the area under aquaculture in the State. The agencies promoting this are ADAK, Brackishwater Fisheries Development Agency, and Marine Products Export Development Agency. For a description of the aquaculture practised in the area, see Nayak, et al, (2000).

[29] See for instance, Raj and Tharakan (1983).

[30] According to the definition the of Census of India, *Pucca* houses are houses which have walls made of burnt bricks, stone duly packed with lime or cement, cement

concrete or timber, and roofs made of tiles, galvanised corrugated iron sheets, asbestos cement sheets, and reinforced brick concrete or cement concrete; *Kachha* houses are houses, which have walls and roofs made of materials other than mentioned above such as unburnt bricks, bamboo, mud, grass, reeds, and thatch, or loosely packed stone and burnt bricks.

31 Organisations like the Kerala *Sastra Sahitya Parishat* and Society for Environmental Education Kerala have been conducting campaigns among the general public on the need to conserve the wetlands.

32 Some of the Acts and Rules passed by the state legislature that have direct implications for the management of wetlands are (i) Kerala Land Utilisation Order 1962, (ii) Environmental Protection Act, 1986, (iii) Coastal Zone Regulation Notification, 1991 and its amendments dated 18 August 1994 and Supreme Court judgment dated 18 April 1996, and (iv) Notification on Environmental Clearance for Projects dated 27 January, 1994. The Indian Fisheries Act, 1897 had two versions applicable in Kerala, one for the erstwhile Travancore-Cochin region and the other for Malabar.

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