

SOCIO ECONOMIC STUDY OF TWO BRACKISH WATER SITES  
IN THE STATE OF KERALA

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# SOCIO ECONOMIC STUDY OF TWO BRACKISH WATER SITES IN THE STATE OF KERALA

## Chapter 1

### Introduction

#### 1.0 Background

Fisheries form an important segment of the Indian economy in terms of income generation and employment. Fisheries contributed Rs 5082 crores at factor cost to India's Gross Domestic Product (GDP) in 1992-93. It also supports the livelihood of about 10 million people. The export earnings from fisheries in 1994-95 is Rs 3270 crores through the sales of 2.7 lakh tonnes of sea food accounting for 3.2 per cent of the total export earnings. Prawn occupies major share in terms of quantity and value and is the potential variety for boosting our exports. With the declining prawn catch from capture fisheries, attention has been diverted to aquaculture.

An estimated 1.7 million hectare (m.ha) of estuarine and brackish water coastal areas suitable for aquaculture operations are available in our country. Out of 1.2 m.ha of potential brackish water area available, 68,000 ha (1993-94) is utilised for aquaculture in all the coastal states. With the increasing emphasis on grow more prawns, efforts are underway to bring more brackish water area under culture.

The Development and Educational Communication Unit (DECU) in Space Application Centre (SAC) of Indian Space Research Organisation (ISRO), Ahmedabad had a programme for identifying the potential brackish water sites in the coastal states for prawn farming through satellite imageries. Feasibility of taking up prawn farming highly depends on the socio-economic status and attitudes of the people living around the sites towards the scheme.

The Central Marine Fisheries Research Institute (CMFRI), Cochin has been identified to conduct the Socio-economic study at the selected sites in the state of Kerala. After identifying the sites through satellite imageries, the DECU, SAC of ISRO, convened a meeting of the principal investigators of the respective states at SAC, Ahmedabad on 30.8.94 and explained their requirements and procedures to conduct the study. Accordingly a contract was made between CMFRI, Cochin and DECU of SAC, Ahmedabad to undertake a socio-economic survey at the selected two sites of Kerala state.

1.2 The study is expected to provide detailed information on various aspects for consideration of farm operation and management. The aim of conducting this socio-economic study is to provide answers to the following questions for taking decisions related to semi-intensive brackish water shrimp farming

in Kerala.

1. How to involve the potentially poor individual beneficiaries in the brackish water semi-intensive shrimp farm operations and management to provide maximum benefits to them?
2. What size of ponds should be designed for a given brackish water shrimp farm in Kerala?
3. What kind of techno-managerial support will be required to run the brackish water shrimp farm?
4. Who should be responsible for master-minding the total operation, input supply, production, supervision and marketing of shrimp in Kerala?
5. How the benefits /losses will be shared by the individual, community and cooperatives?

The Quick and Useful Evaluative Research Investigation (QUERI) technique of Rapid Rural Appraisal (RRA) method was adopted in conducting the present study. The group meetings and household survey were carried out at the surrounding villages of the selected sites at **Kodungallur** region during February-March, 1995 and in **Mulavukadu** region during March-April 1995. Data has been collected using all the four types of schedules.

### 1.3.Report

The report consists of 5 chapters. Chapter 1 deals with introduction and background of the study. In chapter 2, the research methodology adopted in conducting the study has been described. Chapter 3 discusses the details of the survey conducted in villages adjoining the sites at **Kodungallur** and **Mulavukadu**. Chapter 4 encompasses the present utilisation pattern of the selected water bodies and its surrounding regions. Chapter 5 gives the conclusions of the study.



## Chapter 2

### Research Methodology

#### 2.1. Selection of site

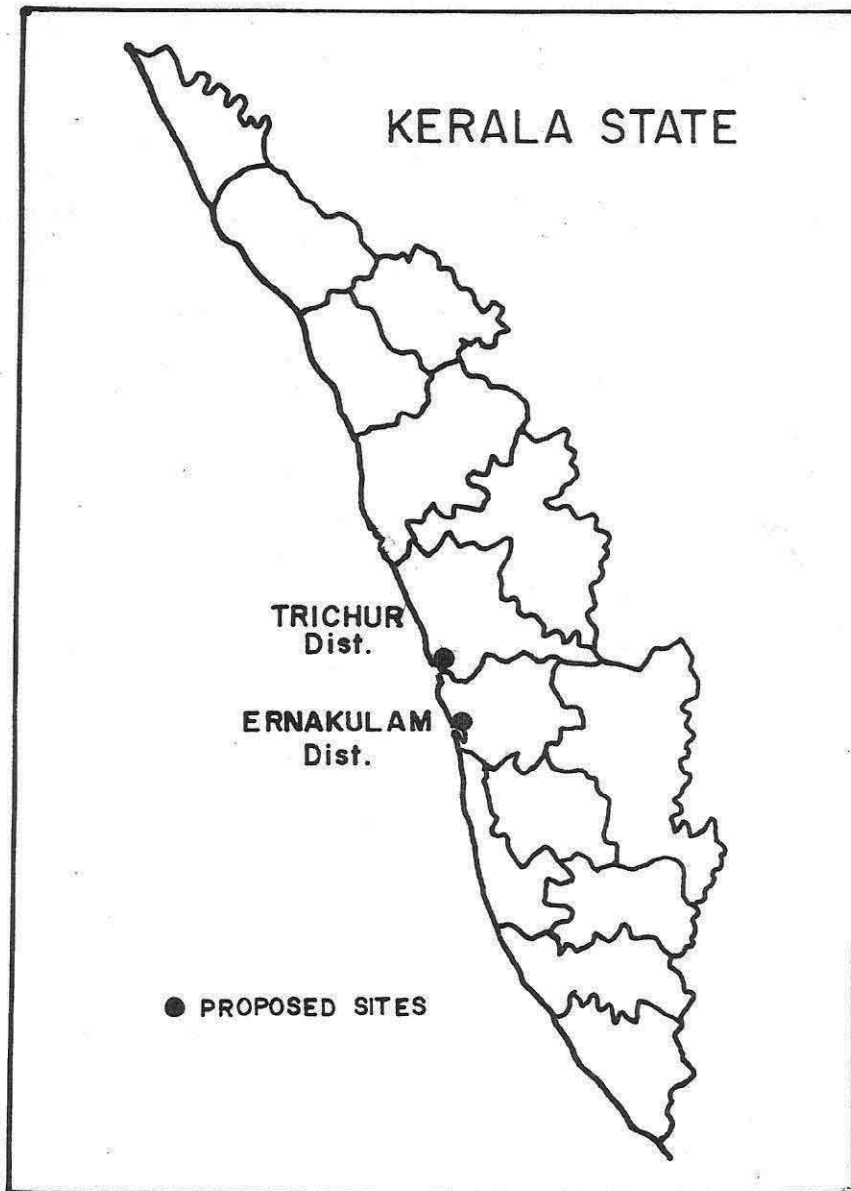
The experts of the Space Application Centre, (ISRO), Ahmedabad, with the help of satellite imageries, identified two sites having an area of about 300 hectares each in **Perumbalam** and **Kodungallur** regions in Ernakulam district of Kerala as the potential sites for the development of brackish water fisheries in the state. An initial survey conducted by the research team comprising scientific and technical staff from Socio Economic Evaluation and Technology Transfer Division (SEETTD) of CMFRI, revealed that **Perumbalam** area is having limited scope for brackish water aquaculture due to man-made changes in recent years. Such changes are,

1. Development of coconut plantations and utilisation of brackish water for retting.
2. Extensive reclamation of brackish water regions for paddy cultivation.
3. Blocking of saline water entry in the identified regions by high bunds constructed by farmers for paddy cultivation.
4. Utilisation of narrow belt of brackish water for navigation purpose.

The above constraints in taking up of brackish water aquaculture in **Perumbalam** was brought to the notice of the DECU, SAC, Ahmedabad. As per the instructions received from the project personnel at DECU, the Kerala State Fisheries Department and the Agency for Aquaculture Development for Kerala (ADAK) were consulted to identify an alternate site. Accordingly an extensive survey was undertaken at selected sites in Ernakulam district and the **Mulavukadu** area was identified.

## **2.2. Identification of villages**

The villages around the proposed sites were selected by purposive sampling. Initially, the panchayat maps were obtained from the offices and the selected sites were located in the map. Then all the surrounding villages located within a radius of 5 km in which potential brackish water farmers live were selected. Unlike the other coastal states, the density of population in Kerala is high. Besides, fisheries form a major occupation of the people living around. Since substantial number of fishermen families are available in the adjoining villages, the selection of potential brackish water farmers will be comparatively easy. The selected adjoining villages in both the brackish water sites are given in **Table 1**.



PROPOSED BRACKISH WATER FARM SITES  
IN TRICHUR AND ERNAKULAM DISTRICTS  
IN KERALA

Fig. 1

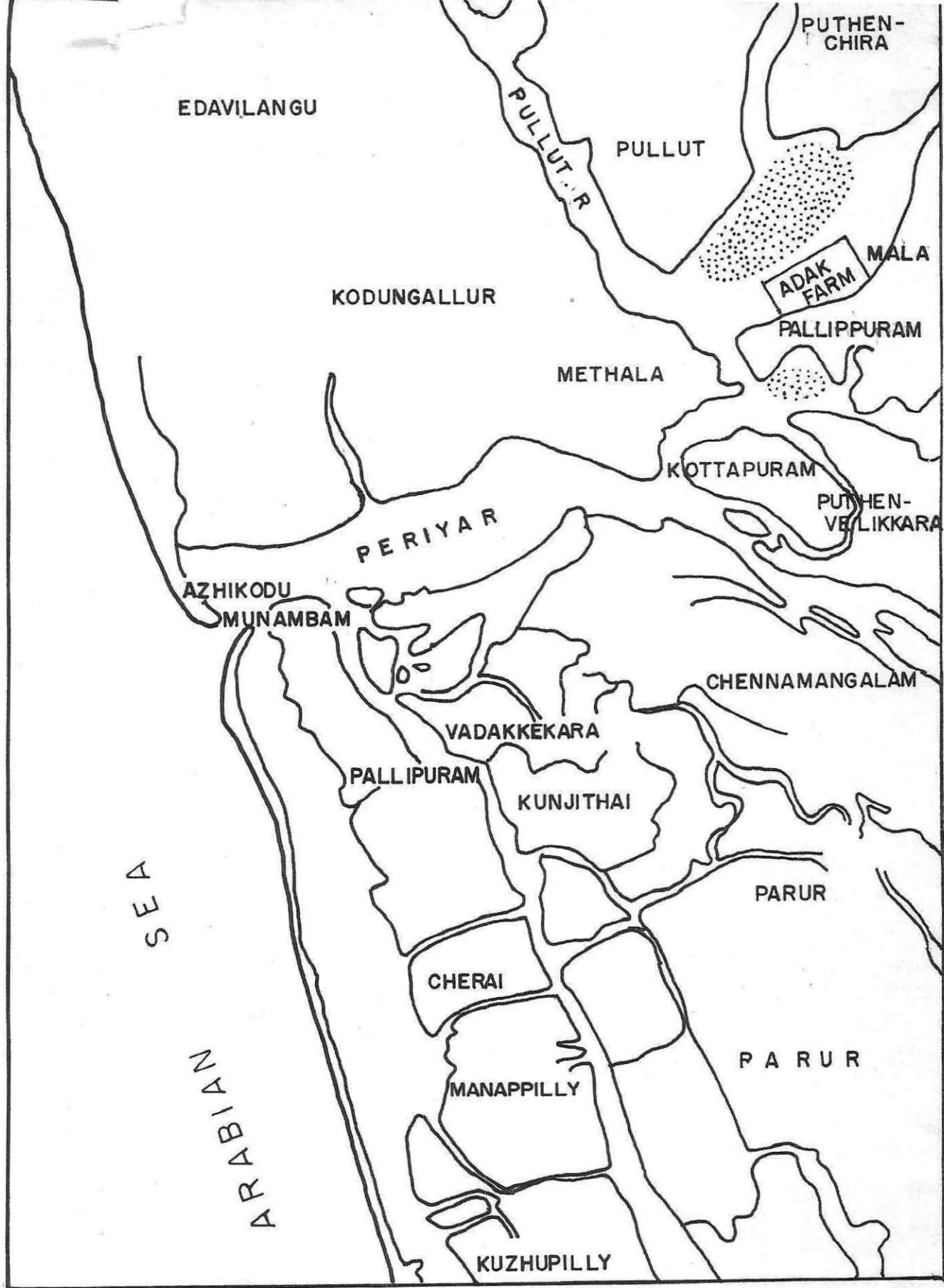
Table 1: Selected villages in the sites

Sl No.	Name of the sites	Adjoining villages	District
1.	Kodungallur	1.Puthenvelikara	Ernakulam
		2.Poyya	Thrissur
		3.Pallipuram	" "
		4.Puthenchira	" "
		5.Methalai	" "
		6.Pullut	" "
2.	Mulavukadu	1.Pizhala	Ernakulam
		2.Kothad	" "
		3.Vallarpadam	" "
		4.Elankunnapuzha	" "
		5.Mulavukadu north	" "

The location of the selected sites is shown in Figure 1. Of the two sites, Kodungallur is near the border of Ernakulam and Thrissur districts. This is approachable by road as well as by ferry from Ernakulam. (Figure 1). The other site, Mulavukadu is an island near Ernakulam district, at a distance of about 5 km. The place is accessible by ferry only. (Figure 2)

### 2.3.Preparation of schedules

The standardized schedules given by DECU (SAC) prepared in consultation with Food and Agriculture Organisation (FAO), Rome were used for the survey. Since the study envisages to follow the Quick and Useful Evaluative Research Investigation (QUERI) technique of Rapid Rural Appraisal (RRA) method, the following schedules were used.




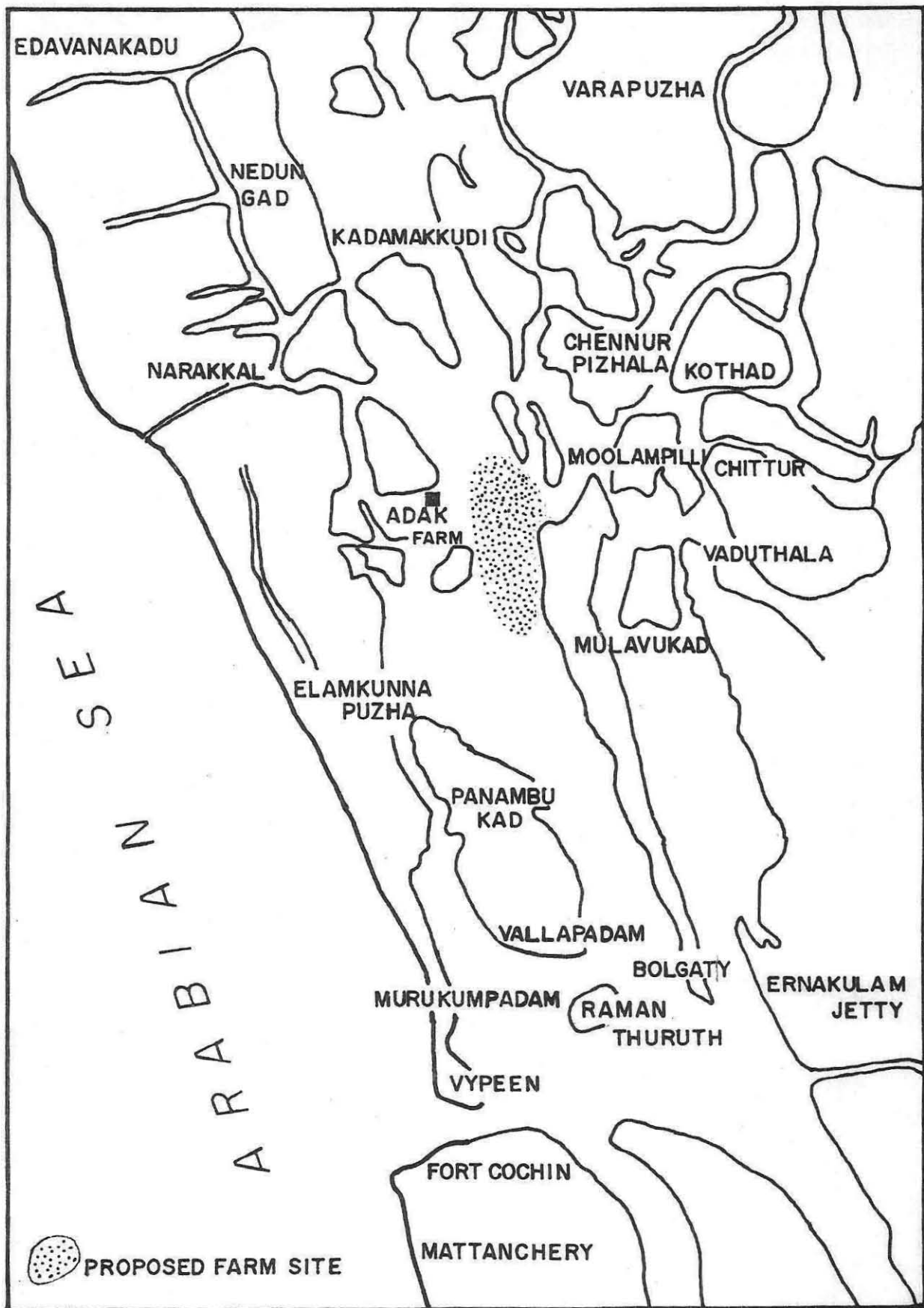
MAP SHOWING PROPOSED BRACKISH WATER FARM SITE  NEAR KODUNGALLUR

Fig. 2



MAP SHOWING THE PROPOSED BRACKISH WATER FARM SITE NORTH OF MULAVUKADU ISLAND NEAR ERNAKULAM

Fig. 3

- (a) Schedule I: Village schedule guide
- (b) Schedule II: Case study of the organisation of fishing within a village
- (c) Schedule III: Group level interview schedule guide
- (d) Schedule IV: Household level interview schedule guide.

#### **2.4. Survey and field training**

A research team comprising scientists and technical personnel of Socio Economic Evaluation and Technology Transfer Division (SEETTD) of Central Marine Fisheries Research Institute (CMFRI) made an initial survey in the sites selected during the second week of January 1995. A team of enumerators were identified for the data collection work and were given training in data collection, using the schedules. The required information were recorded in the schedules in the local language, Malayalam. The research team personnel of CMFRI actively participated in the data collection and also recorded the observation during the group discussions.

#### **2.5. Data collection**

For collection of data, Quick and Useful Evaluative Research Investigation (QUERI) technique of Rapid Rural Appraisal method was adopted. The data collection was held in four phases.

1. In the first phase, the panchayat and village offices were contacted and general information like the area,

population and infra structural facilities available were obtained.

2. In the second phase, panchayat and revenue officials were approached to organise group discussions in the respective villages. Wide publicity was given to ensure maximum participation of local fishermen and extension officials in the group discussion.

3. In the third phase, case studies and group level meetings were conducted in each village and information were filled in schedules II and III.

4. In the final phase, the household survey was conducted in each village by interviewing the sample respondents.

The selection of individual respondents were done on purposive basis after the group discussion and village level data collection. Special care was taken to give representation to both fishermen and non-fishermen households and women respondents. In a family if at least one member is involved either in fishing or fishery related activities, then that family is classified as a fishermen household. Although it was stipulated that individual respondents would be selected during group discussions, the same could not be done as the group discussions attracted less number of women participants. Hence, the research team approached the individuals in the village and



conducted the survey inspite of explaining the purpose of the study repeatedly to the respondents. However, it was observed that the responses of the respondents were mostly similar to those recorded during the group discussions.

#### **2.6. Analysis**

Most of the preliminary analysis were carried out in the field and the final analysis, at CMFRI, Cochin. The computer facility available in the institute was used to the extent possible to ensure the accuracy of the data.

## Chapter 3

### Details of the survey in Kodungallur and Mulavukadu sites

#### 3.1 Organisation of fishing within the fishing villages

In both the sites the organisation of fishing are similar. Kin based as well as non-kin based fishing groups are involved in fishing. The boats are owned mostly by the fishermen families. The crafts include dug out canoe and mechanised boat with various types of gears. In fishing, the owner usually takes the leading role. Besides he arranges for the supply of fishing requirements which are purchased from the nearby markets. The sharing of revenue is on 50:50 ratio for a two member crew. For a higher member crew, the owner gets 20 per cent extra share of the revenue for his investment in craft and gears. The balance is shared equally among the crew members. Women play vital role in marketing of fish, net making and repairing and hand picking of prawns without nets. There is no variation in the distribution system for different varieties of fish. They had no specialised training in fisheries and all that they know were inherited from their ancestors.

### **3.2 Group level discussions**

The Rapid Rural Appraisal is a systematic but flexible means for outsiders to quickly learn about the conditions or issues in a particular or local area using inter disciplinary team. Group level interview is one of the methods of Rapid Rural Appraisal Techniques. As per the programme, group level interviews were organised in the selected villages in both the sites with the help of panchayat presidents and its executive officers. The proceedings of the discussion were recorded simultaneously by two members of the research team. The details of the discussion are given below.

#### **A.Kodungallur site**

In Kodungallur site, the group discussions were held during February-March 1995 in the villages of Puthenvelikara, Poyya-Pallipuram, Puthenchira, Methala and Pullut. The number of participants in the group discussions is given in **Table 2**.

Table 2 : Number of participants in the group discussion-Kodungallur site

Particulars	Poyya Pallipuram	Puthen-velikara	Puthen-chira	Methala	Pullut
Fishing caste/household	18	50	40	25	20
Non fishing caste/household	5	2	4	3	3
Village leaders	2	-	2	-	2
Officials	-	2	-	2	1
Total	25	54	46	30	26

It is observed that, members of fishermen house hold actively participated in the group discussion while those of non-fisheries household did not show much interest. The details of information gathered during the group discussion conducted in the villages adjoining the Kodungallur site are given below.

#### **Poyya-Pallipuram**

The meeting was arranged with the help of panchayat board officials. The people here expressed their willingness to form a cooperative society comprising all fishermen families. They expressed their need for financial as well as technical assistance from the government. They said that they can manage their one acre farm with the help of their own family members. They wanted their society to be led by the fisheries department to guide in the administrative work. All preferred the

individual ownership of the farm by taking risks of loss to work as a labourer for a fixed wage rate.

The fishermen expressed that because of the establishment of Poyya farm, established by ADAK, labourers in the locality were affected. In the Anaipuzha area of this village about 100-150 labourers had lost their jobs, because of this establishment.

The Agency for Development of Aquaculture, Kerala (ADAK) was established in 1989. The agency funded by Kuwait Fund for Arab Economic Development, implemented the prawn culture project in 1993-94. For this purpose, a model farm and training centre for scientific shrimp farming was established at Poyya in Thrissur district in an area of about 100 ha. ADAK extends assistance to survey and inspect the proposed sites, provides financial assistance up to 95% of the estimated cost, provides farm equipments and undertakes the supervision of farm construction, besides offering technical expertise in the cultivation practices.

#### **Puthenvelikara**

The people expressed that the group farming system will be suitable for this brackish water aquaculture scheme. They said that there should be technical and financial help from the government. Besides they expressed their need for training on scientific shrimp farming. They were also of the opinion that

non fishing families should not be included at any cost. They recognised the important role of women in prawn peeling and marketing.

#### **Puthenchira**

Here also, all the participants expressed that group farming is most ideal and suited for the purpose. Members belonging to all castes can come and join in the group and they need, financial, technical and managerial assistance. They require proper guidance to handle money matters, preferably by the office bearers of the fisheries department. A training in scientific prawn farming is felt essential by the members. Womens' role will be helpful in feeding, prawn peeling and marketing. Here also the fishermen expressed their willingness to be individual owners rather than work as wage earners.

#### **Methala**

The fishermen union is very strong here. They expressed that all the union members should get the area for brackish water aquaculture under the proposed project, however small the area may be. Otherwise they are not ready to welcome any schemes. Besides they are of the view that non-fishing families should be included in the scheme. But they feared that such farms will be taken by big business houses in due course. Besides they stated that the plywood industry established in this area had already

affected the brackish water fishery in the area. They are of the view that there is no need to establish a separate fisheries cooperative to run this brackish water farms. Instead they suggested that existing fishermen union will take care of the operations and management of such proposed brackish water farms on cooperative basis.

#### **Pullut**

The participants showed keen interest in establishment of such brackish water farms on collective basis with out affecting the existing income generating activities. They preferred the ownership of the 1/2 - 1 acre farm and run the risk of loss to work as a wage earner in the farm. They expressed their need to have scientific advice, technical training and financial assistance for taking up this brackish water fish farming. They opined that earlier shemes like ADAK's farm at Poyya has deprived their traditional fishing rights in the region and they could not get alternate job opportunities.

#### **Mulavugadu site**

The group discussions in the villages adjoining Mulavugadu site, were conducted during March-April 1995, in the villages of Pizhala, Kothad, Vallarpadam, Elamgunnapuzha and Mulavugadu north. The details of the group discussions are given below. The number of participants in the group discussions is given in **Table 3**.

Table 3 : Number of participants in the group discussion - Mulavagadu

Particulars	Pizhala, Kothad Vallarpadam	Elamkunnappuzha	Mulavagadu North
Fishing caste household	50	32	30
Non fishing caste/ household	10	-	4
Village leaders	5	3	-
Officials	-	4	6
	65	39	40

#### Pizhala, Kothad and Vallarpadam

The group discussion for three villages namely, Pizhala, Kothad and Vallarpadam was conducted in Kadamakudy panchayat office as these villages come under it. Most of the fishermen participated in the group discussion are owners of brackish water farms practising either in seasonal paddy cum prawn farms or perennial farms. There is a service cooperative society in the village to look after the needs of fishermen. They expressed their willingness to include all caste members in their group to form the cooperative. They felt the need for external assistance for financial, managerial and technical aspects including input



availability. They liked to entrust the financial management with the Director <sup>board</sup> of their proposed cooperative society. They felt that individual ownership is better than working as wage earners. The group discussion at Kadamakudy panchayat generated the following points also for consideration.

1. There should be a permanent bund between **Pathalam** and **Manjummel** area which will protect the 1500 acre paddy cultivation besides preventing the salt <sup>water</sup> intrusion.
2. Proper pollution control measures should be taken to prevent the flow of effluents from Eloor industrial area.
3. The traditional farmers should get a fair treatment and adequate allotment of kerosene.
4. Licensing of stake nets and chinese dip nets is necessary.

#### **Mulavugadu north**

The participants of the group discussion favoured the cooperative type of farming for this proposed scheme. They expressed the view that regulation of stake nets and chinese dip nets is most essential to take up this farming. Here also the fishermen expressed their need for ensuring supply of inputs like seed and feed, provision of financial assistance and technical expertise. They opined that the role of women in this fish farming will be essential.

### **Elamkunnapuzha**

Here the view was that cooperative society can be formed with fishermen's participation and landless labourers also. Such cooperative will require the technical, financial, managerial assistance including the input supply. The office bearers and the board of directors will be entrusted with the work of handling the finance. Here also they liked to have a separate ownership.

The group expressed that the participation of women, in fish farming will prove successful. Besides they stated that labourers and workers should be involved in this scheme to make it a successful one.

### **3.3. Analysis of household survey**

The analysis of the household responses was done to find out the basic socio-economic characteristics like age, literacy level, occupation, income and indebtedness which will serve as a background information to understand the conditions of the fishermen to undertake such schemes.

### 3.3.1. Literacy level

The literacy level of the sample respondents is given in Table 4

Table:4 Literacy level of the sample respondents  
(in per cent)

No.	Literacy level	Kodungallur	Mulavukadu
1	Illiterate	3.0	5.0
2	Primary	67.0	18.0
3	Secondary	25.0	77.0
4	College	-	-
5	Vocational	5.0	-
Total		100.0	100.0

It is observed from the table that 67 per cent of the people in Kodungallur have studied upto primary level. In Mulavugadu, the fishermen have better educational background as 77 per cent of them have studied upto secondary level. The overall literacy level of the sample respondents in both the sites are fairly good as almost all of them are literates.

### 3.3.2. Age

The age composition of the sample respondents presented in Table 5 indicates that the percentage of old age group (60 per cent) is high in Kodungallur and that of middle age group is high (75 per cent) in Mulavugadu. Age has an impact on the adoption of any innovation. The high proportion of young and middle age group in

Mulavugadu is conducive for introduction of any innovation in shrimp farming. In the group discussion also, the people from young and middle age group showed keen interest in the programme.

Table 5 : Age group of the sample respondents  
(in per cent)

Age group	Kodungallur	Mulavukadu
Young	-	23
Below 30 years		
Middle	40	75
31 to 45 old	60	3
46 and above		
	100	100

### 3.3.3. Occupation

In both the sites, fishing is the primary occupation of the sample respondents. They follow both kin based and non-kin based fishing. Besides fishing, in some of the fishermen household, atleast one of the family members is employed in the service sector.

### 3.3.4. Housing type

The particulars regarding the housing pattern of the sample respondents are given in Table 6.

**Table 6: Housing type of the sample respondents**  
(in per cent)

No	Type of house	Kodungallur	Mulavukadu
1	Thatched hut	10.0	10.0
2	Katcha house	70.0	67.0
3.	Pucca house	20.0	23.0
Total		100.0	100.0

It is found from the table that the housing pattern does not have a significant difference between the two selected sites. It is also observed from the table that 70 per cent of the people in Kodungallur and 67 per cent of the people at Mulavugadu are living in Kutch houses built of brick walls and tiled roofs. Only 20 per cent in Kodungallur and 23 per cent in Mulavugadu are living in pucca or concrete houses.

### 3.3.5. Land ownership

Table 7: Land ownership of the sample respondents  
(in per cent)

No.	Size of holding	Kodungallur	Mulavukadu
1	Less than 25 cents	90.0	83.0
2	26-50 cents	5.0	5.0
3	51 - 100 cents	2.0	5.0
4	More than 1 acre	3.0	7.0
		100.0	100.0

It is observed from Table 7 that majority of the sample respondents -90 per cent in Kodungallur and 83 per cent in Mulavugadu are having less than 25 cents of land ownership. The percentage of respondents having more than one acre is only 3 per cent in Kodungallur and 7 per cent in Mulavugadu.

### 3.3.6 Indebtedness

The analysis of the indebtedness revealed that, the percentage of population availing loan was lesser (10 per cent) in Kodungallur compared to Mulavukad wherein 60 per cent have availed the loans from institutional agencies. The amount of loan availed ranged from Rs.2000 to Rs.10,000. The loan was utilised mostly for the repair and maintenance of boats and a few respondents (10 per cent) spent it on house repairs.

### 3.3.7. Income

The income status of fishermen household in Kodungallur and Mulavugadu is given in Table B.

Table B : Income level of the sample respondents  
(in per cent)

No.	Income range	Kodungallur	Mulavukadu
1	Below Rs.25,000	62.00	15.00
2	Rs.25,001 - Rs.50,000	30.00	85.00
3	Rs.50,001 -75,000	5.00	-
4	Rs.75,001 to 1 lakh	3.00	-
5	Above 1 lakh	-	-
		100.00	100.00

There is a significant difference in the income levels of fishermen in the two sites. In Kodungallur, 62.0 per cent of the sample respondents obtained an annual income below Rs.25,000 where as in Mulavugadu, 85 per cent got an annual income in the range of Rs.25,001 - 50,000. The high proportion (85 per cent) of respondents at Mulavugadu earning an annual income between Rs.25001-50000 may be due to their proximity to Cochin city which offers adequate job opportunities, substantial number of fishermen practicing traditional prawn farming and good remuneration obtained from practicing brackish water fish farming.

### 3.3.8 Cooperatives and Cooperation

In both the sites the sample respondents expressed their willingness to form a brackish water fisheries cooperative society. Their interest to work hard with a profit motive, experience in prawn culture and a complete awareness about the concept have prompted them in favour of formation of such a cooperative society.

Their awareness about the concept of brackish water fisheries and the subsequent development in the field is attributed to their high exposure to the mass media like Radio Television and newspaper.

In both the sites, the respondents were ready to include the other caste members also in their cooperative societies. They expressed that they have no objection to such proposals.

In Mulavugadu all the respondents said with confidence that they are capable of running the society by themselves within the village. But in Kodungallur about 40 per cent expressed the need for external advice to run the society in their village and they preferred the assistance from the state fisheries department in handling the administration of the society.

In both the sites the respondents were willing to manage their allotted farm efficiently by their individual care, by taking the risk of a loss rather than working in a farm for a fixed wage.



They required external assistance in terms of financial, technical and managerial advice including the supply of inputs like seed and feed.

The respondents wished to have a board of directors for managing the cooperative societies including handling of funds. Besides in both the sites, there is adequate man power to undertake the prawn farming activities. There is also no objection as to the inclusion of non fishing family members in this venture.

Women participation is felt very much essential in feeding prawn farms, hand picking of prawns and other fish, sorting, marketing and peeling of prawns. The respondents expressed that the assistance of women in prawn farming is very much needed for the success of the venture.

In general, the people here are hard working, ready to take up such a new venture, enthusiastic and profit seeking. They are ready to take up ~~the~~ this prawn farming practice as a group farming enterprise if they had external help in terms of finance, input supply and technical assistance. They are also confident of running the enterprise individually because of their experience in prawn farming.

## Chapter 4

### Current utilisation pattern of selected water bodies

The group meeting held at surrounding villages of the selected sites evoked a lot of discussion on the current utilisation pattern of the identified brackish water region. Fisheries form the most important source of income to these people. Capture and culture fisheries are practiced by the fishermen in the brackish water and the adjoining low lying areas respectively.

Capture fishery resources of the brackish water comprise several species of fishes, crustaceans and molluscs belonging mostly to marine habitat. The back waters also provide migratory passage to several varieties of fishes and a good nursery ground for some species of prawns. The giant fresh water prawn Macrobrachium rosenbergii also uses this ecosystem for spawning and for early stages of development. Apart from the fin fishes like pearl spot, mullets, catfishes, perches, milk fishes, mojarras croakers and prawns, oysters, mussels, clams and crabs contribute to a good fishery in the brackish water.

The present fishing pattern in the capture fisheries involves the use of cast nets, stake nets, chinese dip nets and hand picking (*Thappidithal*) mostly by women. The people belonging to lower (Below Rs.25,000 per year) and middle income

(Rs.25,001-50,000) groups are predominantly involved in this type of fishing.

In adjoining low lying areas of the selected brackish water site, three types of prawn culture practices are followed. They are,

1. Seasonal prawn culture
2. Prawn farming on perennial fields
3. Semi-intensive prawn culture

#### **1. Seasonal prawn culture practice**

The practice of growing prawns in rice-fields on a commercial scale is an important part of prawn industry in Kerala. The Pokkali fields in Cochin area lie close the backwaters and at a slightly higher level than the lake. These fields are either connected with the estuary directly or linked by a number of tidal canals.

Paddy cultivation is done from June to September (South-west monsoon period) . During this period, the salinity of brackish water is reduced because of the rains, thus making the farms conducive for paddy cultivation. After the monsoon is over, the traditional prawn culture starts. After the paddy harvest, the water is allowed from the estuary to enter the fields freely. Most of the paddy fields are small holdings and a number of such fields lying together in an area is converted into a single block

and leased out to contractors for prawn culture operations. Bunds are repaired and strengthened with clay and hay. Sluice gates are inserted into the primary bunds to regulate the flow of water from and into the fields. A sluice gate is a rectangular hollow structure with one end opening into the pond and the other, into the estuary or canal outside. The lateral sides and the bottom are made of wooden planks. At the centre of the sluice, two vertical grooves are provided on the side walls into which planks are inserted to control the flow of water. On the inner side of the wooden sluice is a close meshed mosquito netting to prevent the escape of prawns. The number and size of sluice gate vary with the size of the farm. Kerosene lamps are hung above the sluice gate to attract the juvenile of prawns into the pond. Harvesting of prawns and fishes are conducted during the new moon and full moon days using bag nets, drag nets and traps. The major types of prawn species caught are M.dobsoni, M.monoceros, P.monodon and various types of fishes like tilapia, mullets, and etrophus besides small quantities of crabs. Prawn culture is completed by mid-April and the fields are dried and drained. The entry of water is prevented using wooden planks of the sluice gate. Once the pond is dried, it is raked up and heaped into small mounds, which is allowed to dry until the commencement of the monsoon rain which leach out the salt contents from the mounds into the surrounding water in the field.

With the advancement of south-west monsoon, the salinity decreases and the paddy seeds are sown on the top of the mounds and thus the cycle is repeated.

#### **4.2.2.Prawn farming in perennial fields**

The perennial ponds are water impoundments which will have water throughout the year and the trapping and holding method is practiced throughout the year with periodic harvesting during the new moon and full moon days. It is basically an enclosed shallow estuarine area, connected to the tidal creeks and estuaries by means of sluice gates. These farms are either owned by the government agencies or farmers' societies and are leased out to contractors for a period of 12 months. The culture method, harvesting and species composition are similar to that of seasonal farms.

#### **4.2.3.Semi-intensive culture**

Semi-intensive prawn culture is done on *Pokkali* fields in Kerala. The fields are deepened with strong dykes. The farms are provided with one peripheral and two cross channels. The average depth of the pond is maintained between 0.5 to 1 metre. A wooden sluice gate with provisions for a mosquito netting and a wooden shutter is fixed in each field. This is for regulation of water flow and to prevent the entry of unwanted fishes into the pond as

well as to prevent escape of the stocked prawns. Proper exchange of water in the pond is maintained by the sluice gate operation during high tide and low tide. Pumps are used to drain the ponds during eradication of predators and also for harvesting. The ponds are prepared before stocking of seeds by removing the predators using ammonia @ 80 kg/ha and by application of lime. The hatchery produced seeds of the desired species are used. The seeds are maintained in an *happa* for 10-15 days which are then released into rearing ponds. Regular water exchange is essential during this period. Prawn feeds are prepared locally and are provided twice daily, the major component being clam meat. The fields are harvested 100-110 days after stocking, using bag nets, drag nets and cast nets. The harvested products are sold to the exporters who offer maximum price for the product.

In the group level meetings, both the segments of the population depending either on capture or culture fisheries, shown keen interest to participate in the proposed brackish water project. But they have a strong feeling that all of them should be included in this programme. This is because they expressed that displacements caused by the earlier brackish water development schemes have not matched with adequate rehabilitation measures. Unless a suitable organisational base like a cooperative society is created ensuring the participation of all these people, the possibility of conflicts is likely to come up.

Hence a cautious approach is required in the selection of beneficiaries for the scheme.

## Chapter 5

### Conclusions

The success and feasibility of prawn farming in various brackish water sites not only depends on the physical parameters but also on the socio-economic conditions and attitudes of the local fishermen. The villages surrounding the selected sites at Kodungallur and Mulavugadu of Central Kerala are thickly populated. Hence, the identification of villages is confined to the villages adjoining the selected brackish water sites. The villages covered at Kodungallur site are Puthenvelikara, Poyya-Pallipuram Puthenchira, Methala & Pullut and at Mulavugadu site are Pizhala, Kothad, Vallarpadam, Elamkunnapuzha and Mulavugadu north. Since there are about 1500 families in the adjoining villages of each site, selection or identification of beneficiaries does not pose a problem.

The people engaged in brackish water capture fisheries especially at the selected sites should be involved in the proposed semi-intensive shrimp farm operations. These fishermen are traditionally operating stake nets, chinese dipnets and cast nets for their livelihood. They are aware of their fishing rights in these regions as it remained as a common property resource for many years. Hence, naturally these segments of the



population should be given preference in the allotment of brackish water semi--intensive shrimp farms.

Farmers engaged in shrimp farming in the adjoining low lying areas, are also interested to get ownership of the proposed shrimp farms. They feel that the free flow of water to their seasonal as well as perennial farms will be affected with the development of the proposed brackish water farms and it will be difficult for them to practice shrimp farming in their own farms. However, they are economically better than the non-owners who are depending only on traditional fishing in brackish water. The group level meetings generated lot of discussions on the ownership pattern of the proposed shrimp farms and almost all participants want their involvement in the new scheme.

The size of holdings in Kerala is comparatively very small. The present study indicates that more than 80 per cent of the households of the selected villages are having a land ownership of less than 25 cents. The pressure on land is so high that even the brackish water regions are reclaimed for housing purposes. The group discussions and household survey further indicated that the fishermen preferred the ownership of the piece of the brackish water farm to work on a fixed wage as a labourer. It appears that, there will be stiff competition among the

aspirants to have the ownership of the brackish water farm. Hence from the social point of view, the size of the farm should be half an acre.

The fishermen are in need of the supply of right type of seed at right time. The seed supply from the wild is not dependable. Adequate shrimp hatcheries should be established to ensure the supply of quality seeds. While prawn farming is fast expanding, the corresponding feed requirements also increases, requiring serious attention. Farmers require uninterrupted supply of feed. The farmers lack technical skill in the scientific prawn farming and indicated the need for training on scientific aspects of shrimp farming by established institutions like Central Marine Fisheries Research Institute (CMFRI) and Central Institute of Brackish water Aquaculture (CIBA). Since semi-intensive prawn farming is capital intensive, farmers need financial assistance from the institutional agencies.

Farmers' direct involvement in the development and allotment of farms, input procurement, production and marketing is essential for the success of the brackish water prawn farms in Kerala. The organisation of prawn farmers' cooperative in each site giving due representation to all sections of the people appears to be the only way for the successful implementation of the scheme. The Board of Directors of the cooperative societies may be entrusted the responsibility of taking managerial

decisions.

The study indicates that the respondents are willing to take the risk in operation and management of the farms. The operation of the brackish water aquaculture scheme is likely to generate substantial income and thus improve the socio-economic conditions of the beneficiaries. The equitable distribution of the profit to the individuals of the community can be decided by the members of the society.

In general, the scheme is welcomed by most of the local people. But they are sceptical about their displacement and rehabilitation. A cautious approach of involving all sections of the local people in the process of development, allotment and management of shrimp farms alone can ensure the success of this brackish water aquaculture scheme.